

Exabyte 220 Library

Installation and Operation



1003751-000

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Revision History

Revision	Date	Description
000	March 2000	Initial release

Note: The most current information about this product is available at Exabyte's web site (www.exabyte.com).

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1003751-000

Safety Agency Standards

The Exabyte 220 complies with the following domestic and international product safety standards:

- UL Standard 1950, 3rd Edition, Information Technology Equipment including Electrical Business Equipment
- CSA Standard C22.2 No. 950-95, Safety of Information Technology Equipment including Electrical Business Equipment
- IEC 950/EN60950, Safety of Information Technology Equipment including Electrical Business Equipment

FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Shielded cables are required for this device to comply with FCC Rules. Use shielded cables when connecting this device to others.

Industry Canadian Notice per ICES-003

English This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

French Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Notice

This equipment has been tested and complies with the following requirements:

- EN 55022/CISPR 22, Class A
- EN 50082-1: 1992

Bureau of Standards, Metrology, and Inspection (BSMI) - Taiwan

This equipment has been tested and complies with CNS C 6357.

警告使用者：
這是甲類的資訊產品——在居住的環境中使用時——可能會造成射頻干擾——在這種情況下——使用者會被要求採取某些適當的對策——

English Warning! This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures.

Australia/New Zealand

This equipment has been tested and complies with AS/NZS 3548.

Product Warranty Caution

The Exabyte® 220 Library is warranted to be free from defects in materials, parts, and workmanship and will conform to the current product specification upon delivery. For the specific details of your warranty, refer to your sales contract or contact the company from which the library was purchased.

The warranty for the library shall not apply to failures of any unit when:

- The library is repaired by anyone other than Exabyte's personnel or approved agent.
- The library is physically abused or is used in a manner that is inconsistent with the operating instructions or product specification defined by Exabyte.
- The library fails because of accident, misuse, abuse, neglect, mishandling, misapplication, alteration, faulty installation, modification, or service by anyone other than the factory service center or its approved agent.
- The library is repaired by anyone, including an approved agent, in a manner that is contrary to the maintenance or installation instructions supplied by Exabyte.
- Exabyte's serial number tag is removed.
- The library is damaged because of improper packaging on return.

CAUTION

Returning the library in unauthorized packaging may damage the unit and void the warranty.

If problems with the library occur, contact your maintenance organization; do not void the product warranty by allowing untrained or unauthorized personnel to attempt repairs.

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How to use this manual

First-time installation

If you are installing the library for the first time, refer to the following chapters:

- [Chapter 1](#) provides an overview of the product's features and components. [Appendix A](#) lists additional library and tape drive specifications.
- [Chapter 2](#) provides instructions for installing the library hardware, connecting the library to the SCSI bus, and powering on the library. [Appendix B](#) provides additional information about SCSI configurations.
- [Chapter 3](#) describes how to configure the library for operation on the SCSI bus and for operation with your application software. Follow the steps at the end of this chapter to verify the setup and to begin library operation.

Operation

During normal library operations, you do not need to intervene in cartridge processing. However, you may need to refer to these chapters for some occasional tasks:

- [Chapter 4](#) describes how to operate the library in different control modes, how to replace cartridges and magazines, and how to reset the library.
- [Chapter 5](#) describes how to monitor, clean, and reset the tape drives. It also describes how to eject cartridges manually.

Troubleshooting and service

If you need troubleshooting and service information, refer to these chapters:

- [Chapter 6](#) provides troubleshooting and diagnostics information. [Appendix C](#) lists error codes and suggested corrective actions.
- [Chapter 7](#) describes basic maintenance and how to return the library for service, if necessary.

Contacting Exabyte

If you need to contact Exabyte for supplies, technical support, or service, see the inside back cover of this manual.

Related publications

For information about the library and the standards used by the library, refer to the following publications. To order an Exabyte publication, see “Contacting Exabyte” on the inside back cover. To download a PDF version of an Exabyte publication, visit the Exabyte web site (www.exabyte.com).

Exabyte 220 Library

- *Exabyte 220 Product Specification*, 316413
- *EXB-210 and EXB-220 SCSI Reference*, 510806
- *Exabyte Bar Code Label Specification for 8mm Cartridges*, 308607
- *EXB-220 Maintenance*, 320081

Exabyte Mammoth-2 Tape Drive

- *Exabyte Mammoth-2 Product Specification*, 330874
- *Exabyte Mammoth-2 Installation and Operation*, 330875
- *Exabyte Mammoth-2 SCSI Reference*, 330876

Exabyte Mammoth Tape Drive

- *Exabyte Mammoth Product Specification*, 306482
- *Exabyte Mammoth SCSI Reference*, 306483
- *Exabyte Mammoth Installation and Operation*, 306484

Standards

- *ANSI Small Computer System Interface (SCSI-2)*, X3.131-1994
- *ANSI Helical-Scan Digital Computer Tape Cartridge*, X3B5/89-136, Rev. 6
- *ANSI SCSI-3 Fast20 Parallel Interface (Fast-20)*, X3.277 – 1996
- *ANSI SCSI Parallel Interface-2 (SPI-2)*, X3T10/1142D, Rev. 11
- *Standard ECMA-249, 8mm Wide Magnetic Tape Cartridge for Information Interchange – Helical Scan Recording – DA-2 Format*, June 1998
- *Standard ECMA-293, 8 mm Wide Magnetic Tape Cartridge for Information Interchange – Helical Scan Recording – MammothTape-2 Format*, December 1999
- *TapeAlert Specification*, Version 1.0, December, 1996

Conventions used in this manual

This manual uses the following conventions:

 Boxed text indicates keys on the operator panel.

Note: Notes provide additional information.

➤ **Important** Information next to the word “Important” helps you complete a procedure or avoid extra steps.

CAUTION

Boxed text under the word “CAUTION” provides information you must know to avoid damaging the library or tape drives or losing data.

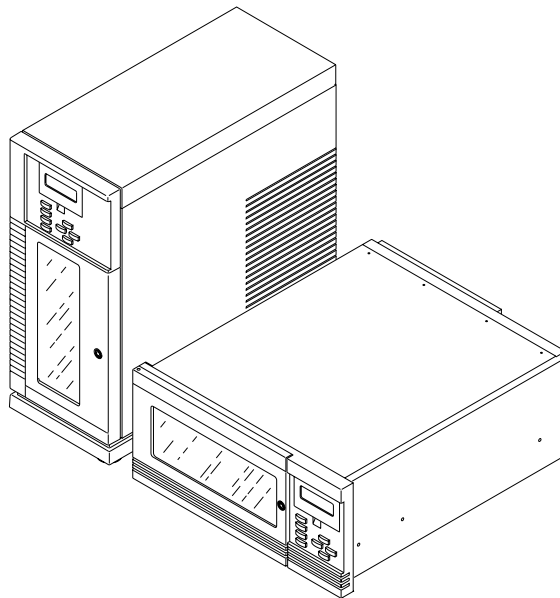
WARNING!

Boxed text under the heading “WARNING!” provides information you must know to avoid personal injury.

1 Product Overview

Congratulations on selecting the Exabyte® 220 Library. Your new library provides unattended data storage, archiving, backup, and retrieval for midrange and high-end workstations, servers, and networks. The robot automatically moves cartridges between tape drives and storage slots, while the tape drives read and write data.

The library is available in standalone and rack-mount models, as shown in the figure.



About the Exabyte 220

The Exabyte 220 library accommodates two cartridge magazines, 20 advanced metal evaporative (AME) cartridges, and one or two of the following Exabyte MammothTape™ technology drives:

- Mammoth-2 (M2™)
- Mammoth

The library is available in the following wide or narrow SCSI configurations:

- Single-ended
- Low-voltage differential (LVD)
- High-voltage differential (HVD)

The library can operate as three independent devices on up to three SCSI buses. The Mammoth tape drive is a SCSI-2 device. The M2 tape drive is an Ultra2 SCSI device.

The following table shows the maximum storage capacity of the Exabyte 220 library, depending on what type of tape drives are installed and what type of cartridges are used.

	Type of data cartridges	Capacity (20 cartridges)
M2 drive	AME with SmartClean, 225 meters	3 terabytes ^a
Mammoth drive	AME, 170 meters	800 gigabytes ^b

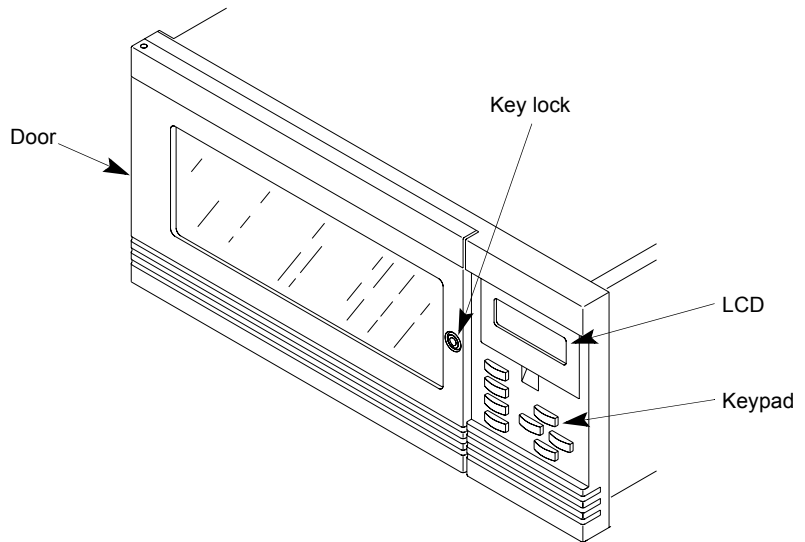
^a Assumes an average 2.5:1 data compression ratio.

^b Assumes an average 2:1 data compression ratio.

Library components

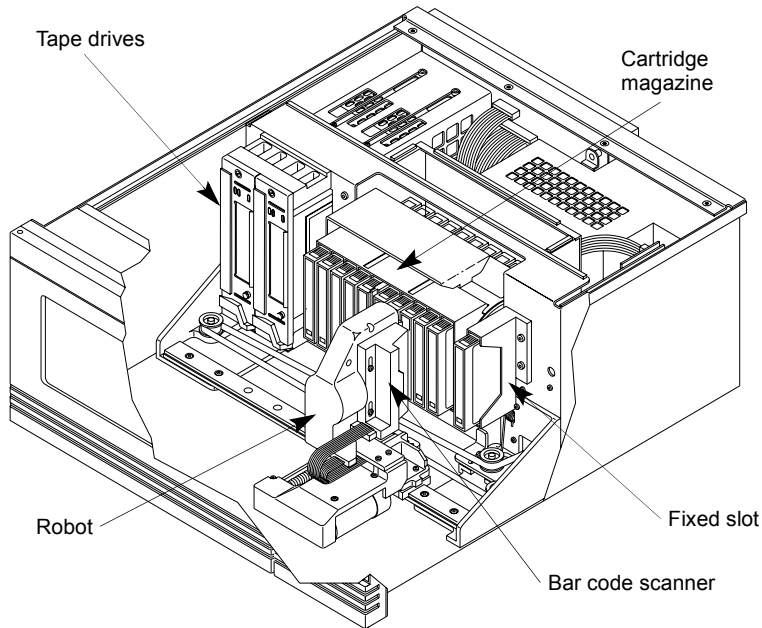
This section provides an overview of the library components.

Front panel components



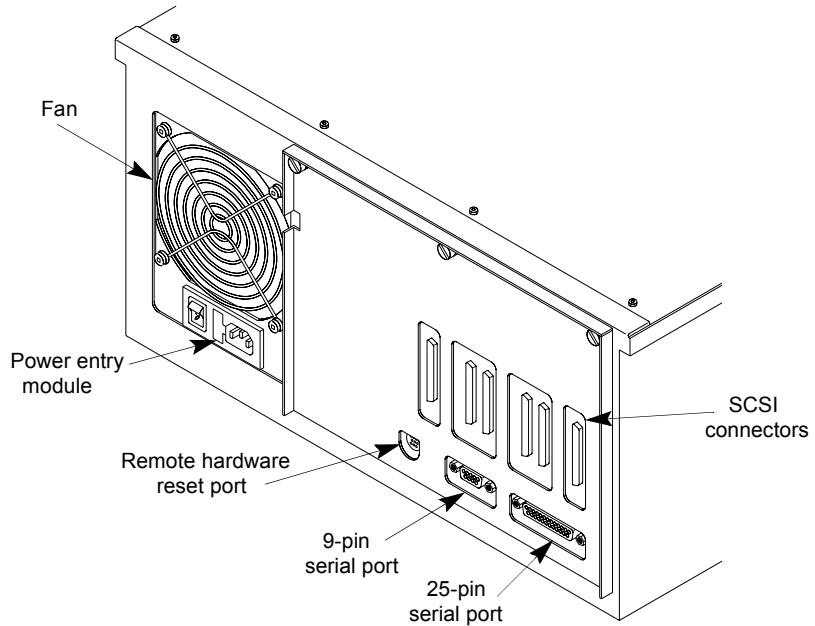
- **Door and key lock.** The front door features a key lock that enables you to lock the door for data security.
- **LCD and keypad (operator panel).** The LCD (liquid crystal display) and keypad allow you to view the operational status of the library, access a menu of operations, and view status messages. If necessary, you can tilt the LCD for easier viewing.

Internal components



- **Tape drives.** The library can include one or two Exabyte Mammoth or M2 drives, which are housed in drive carriers.
- **Data cartridge magazine(s) and fixed slot.** The Exabyte 220 includes two removable magazines on a rotor. Each magazine stores up to ten data cartridges. The fixed slot allows you to store a cleaning cartridge or an additional data cartridge.
- **Robot.** The robotic assembly moves cartridges between the storage locations and the tape drives. The robot can also include a bar code scanner, which reads bar code labels affixed to the cartridges.

Back panel components



- **Fan and power entry module.** The fan reduces the library's operating temperature. The power entry module includes the AC power connector, power switch, and fuse drawer.
- **Remote hardware reset port.** This port allows you to connect a remote reset cable for remote resets.
- **9-pin and 25-pin serial ports.** Two serial ports allow you to connect a serial cable and terminal for diagnostics.
- **SCSI connectors.** The SCSI connectors allow you to connect the library to the SCSI bus.

Notes

2 Hardware Installation

This chapter describes how to install the library hardware, which includes the following steps:

- Unpacking the library
- Obtaining accessories and equipment
- Preparing for hardware installation
- Installing the library into a rack (if you have a rack-mount model)
- Preparing and installing cartridges
- Connecting the library to a SCSI bus
- Connecting the power cord
- Powering on the library
- Verifying the hardware installation

Unpacking the library

Complete the unpacking steps printed on the box. Save all the original packing materials in case you need to ship or move the library later.

Obtaining accessories and equipment

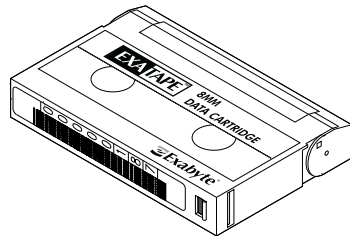
Make certain you have all the accessories and equipment for library operation, as indicated in the table below. Many of these items are included in the library accessories box, shipped in a separate box at the top of the carton.

Required accessories and equipment ^a	
Power cord	Included with the library. If you need to use a different power cord, see page 146 .
Two keys for front door	Included with the library.
Jumper(s) for connecting the library and tape drives to a single SCSI bus	Included with the library if two tape drives are installed.
Eight 10-32 × 0.5 truss head screws and clip nuts	Included with rack-mount libraries.
Two slide rails, attached to the sides of the library	
SCSI cables	If these items are not included with the library, contact Exabyte to purchase them. If you want to use your own, see Appendix A for specifications.
SCSI bus terminator(s) (required if the library or one of the tape drives is the last device on the bus)	
Bar code labels	Sample bar code labels are included with the library. For information about preparing bar code labels, refer to the <i>Exabyte Bar Code Label Specification for 8mm Cartridges</i> . For information about approved bar code label vendors, visit www.exabyte.com .
Data cartridges and cleaning cartridges	If cartridges are not included with the library, contact Exabyte to purchase them. See “Selecting data cartridges” on page 9 for more information about the appropriate cartridges to use.

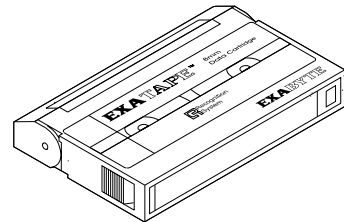
^a Contact Exabyte to purchase these items (see “Contacting Exabyte” on the inside of the back cover).

Selecting data cartridges

Two types of Exabyte cartridges are available for use with the MammothTape drives installed in the library: advanced metal evaporated (AME) with SmartClean™ technology and standard AME media.



AME with SmartClean



Standard AME

AME with SmartClean

Specially designed for use with M2 tape drives, AME cartridges with SmartClean combine reliable AME recording media with a short segment of head cleaning material. When the M2 drive determines cleaning is needed, it locates the cleaning material and performs the cleaning automatically. AME cartridges with SmartClean are easily identified by their cobalt-blue color and are available from Exabyte in lengths of 75 meters, 150 meters, and 225 meters. (Mammoth tape drives cannot read or write to the AME with SmartClean cartridges.)

Standard AME

Specially designed for use with Mammoth tape drives, Exabyte's standard AME cartridges are available from Exabyte in lengths of 22 meters, 45 meters, 125 meters, and 170 meters. (M2 tape drives can read and write to standard AME cartridges, but will require cleaning with a cleaning cartridge.)

Selecting cleaning cartridges

For Mammoth tape drives, use an Exabyte Mammoth Cleaning Cartridge or a cleaning cartridge approved by Exabyte for use with MammothTape technology drives. The tape drive ejects all other cleaning cartridges. If necessary, the M2 tape drive can also be cleaned with an Exabyte Mammoth Cleaning Cartridge.

Determining media and drive compatibility

The following table summarizes which media is compatible with each tape drive.

	Compatibility	
	Mammoth	M2
AME with SmartClean™	No	Yes
Standard AME	Yes ^a	Yes ^b
MP	Yes ^c (read only)	No ^c
Mammoth Cleaning Cartridge	Yes	Yes ^b

^a Mammoth requires FEncode v39E and EEncode 8E00012F to write and read AME 125m tapes and requires FEncode v41B and EEncode 8E00012F to write or read AME 45m tapes.

^b For optimal tape drive performance and reliability, Exabyte recommends only SmartClean media for M2 tape drives and libraries. M2 can use other AME media, but will require regular cleaning with an Exabyte Mammoth cleaning cartridge.

^c Mammoth can read, but not write, metal particle (MP) media written in one of the following formats: 8500c, 8500, or 8200. M2 cannot write data to or read data from metal particle (MP) tape. If you insert an MP cartridge, the M2 immediately ejects it. If you need to retrieve data from MP tape, contact Exabyte Technical Support (see “Contacting Exabyte” on the inside back cover) for information about data conversion services.

Preparing for hardware installation

Before you begin hardware installation, do the following:

- Make certain the SCSI host bus adapter card installed in the host computer and the application software are compatible with the Exabyte 220. You can obtain software compatibility information from Exabyte's web site (www.exabyte.com). You can install the software application on the host computer before or after library installation. However, if you install the software first, you may need to reconfigure it for use with the library.
- Ensure that the work area is free from conditions that could cause electrostatic discharge (ESD). Discharge static electricity from your body by touching a known grounded surface, such as your computer's metal chassis.
- Locate an appropriate area for the library. The library must have a level surface near a readily accessible outlet. (If you have a standalone library, adjust the feet to make it level.) In addition, there must be approximately 6 inches (15 cm) of open area behind the library for adequate air flow.

WARNING!

Before performing any installation or maintenance procedures, be sure that the library power switch is in the off position and that the power cord is disconnected from the library and the outlet.

Installing the library into a rack

If you have a rack-mount library, follow these instructions to install the library into a standard EIA 19-inch rack. If you have a standalone model, skip this step and go to [“Preparing and installing cartridges” on page 18](#).

WARNING!

The rack-mount library weighs 50 – 70 pounds (27.2 – 31.8 kg); the standalone library weighs 70 – 90 pounds (31.8 – 40.9 kg). At least two people are needed to move or lift the library. Most of the weight is toward the back of the library.

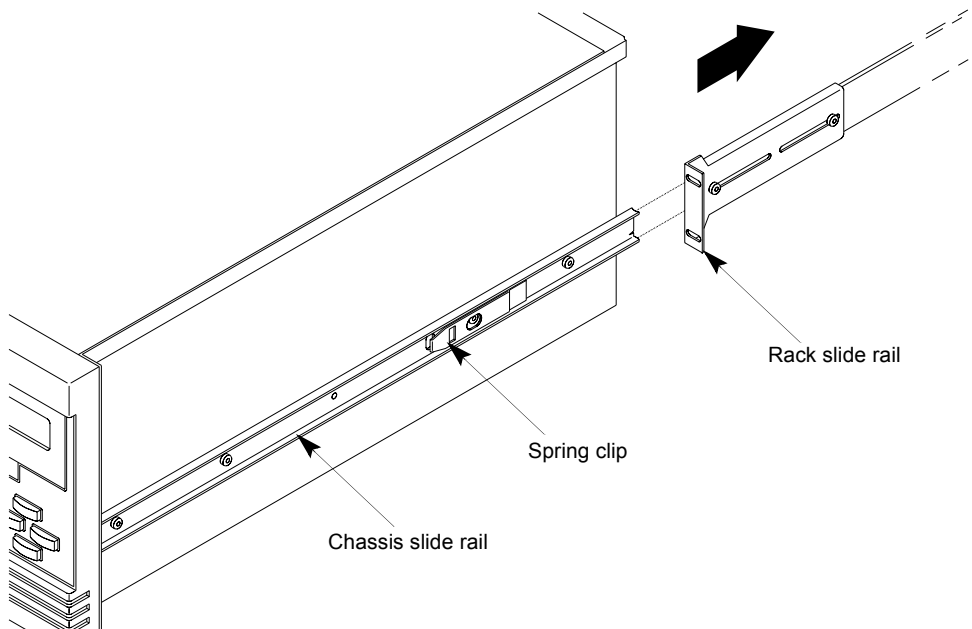
Make sure you install the rack-mount library in the lowest possible location in the rack. For best results, use a rack with extension support legs.

For this procedure, you need the following:

- Standard EIA 19-inch rack
- TORX screwdriver with T-25 bit
- T-15 bit, if you need to extend the rails
- Eight 10-32 × 0.5 truss head screws (provided in the accessory box)
- Eight clip nuts (provided in the accessory box), necessary if the rack does not have threaded holes

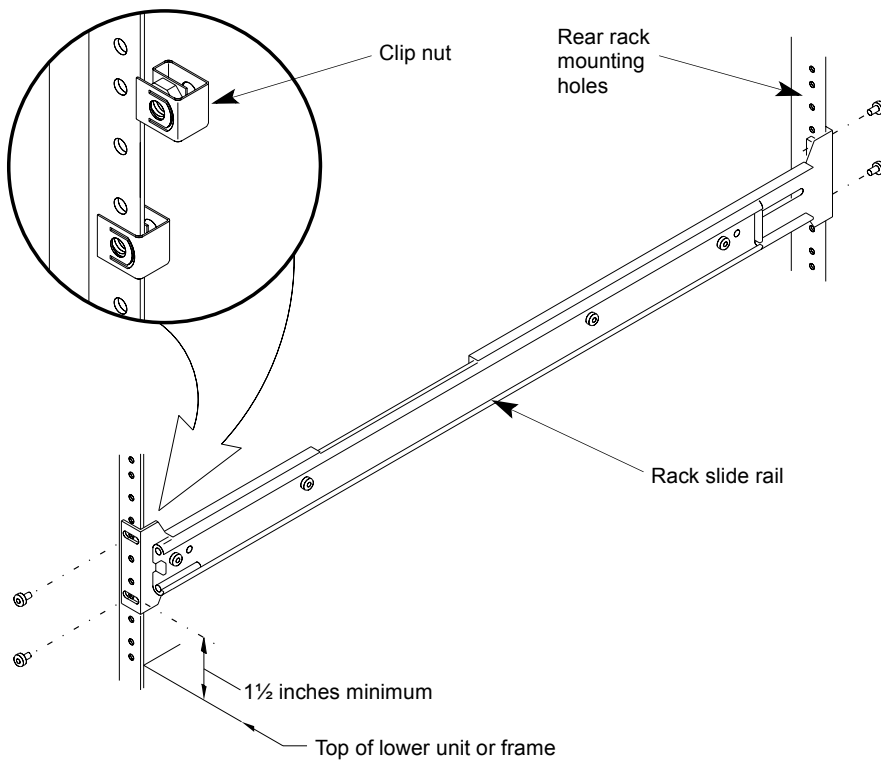
To install the library into a rack:

1. Locate the slide rail assembly attached to each side of the library chassis, as shown in the figure.
2. Slide the rack slide rail toward the rear of the library, as shown in the figure. Press the spring clips to remove the rack slide rail from the chassis slide rail.

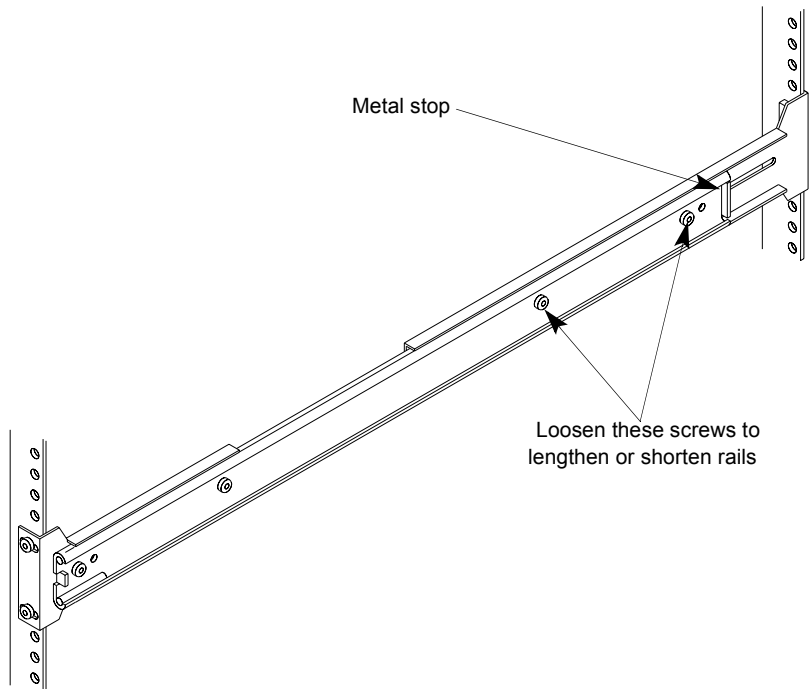


3. Locate the mounting holes on the rack where you want to install the library. Allow 1.5 inches (3.8 cm) minimum clearance below the bottom mounting hole.

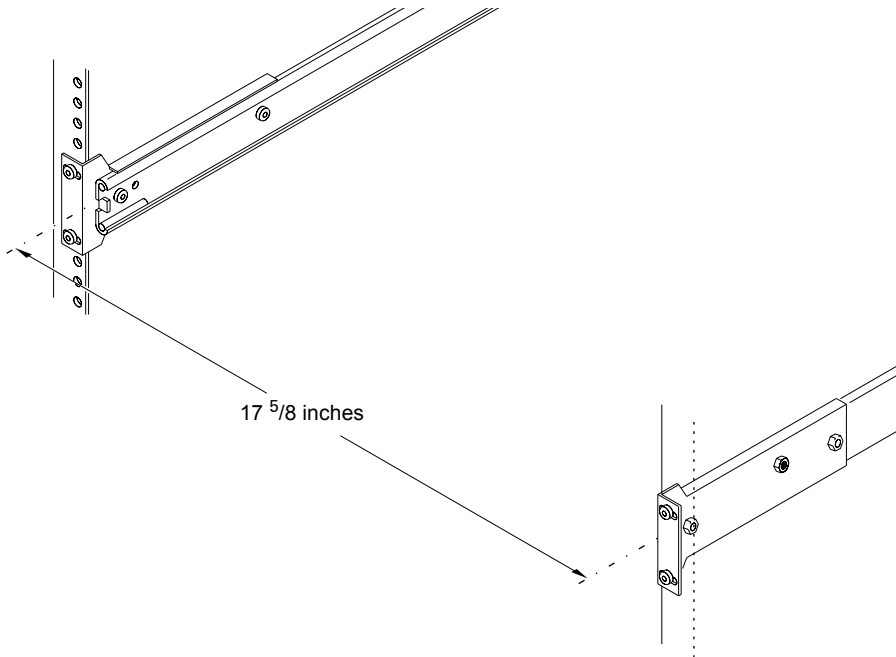
Note: If the rack does not have threaded holes, attach the clip nuts provided with the library over the mounting holes, as shown in the figure.



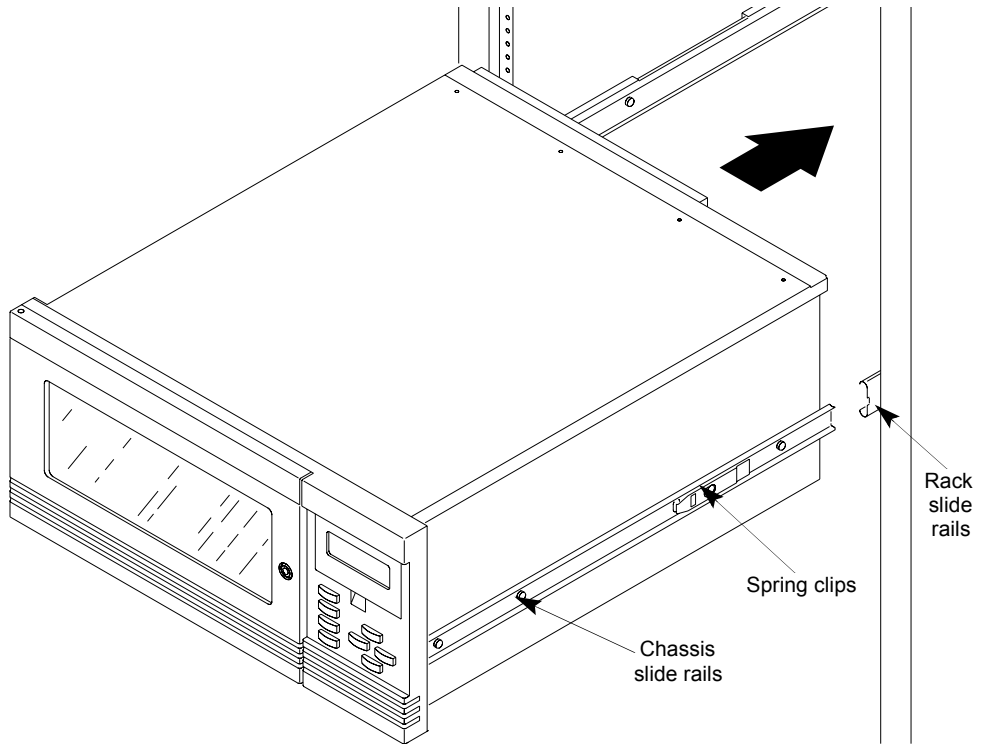
4. Orient the rack slide rails so that the metal stop is towards the back of the cabinet, as shown in the figure. If the rails are not long enough to reach the back of the cabinet, use a T-15 TORX driver to loosen the nuts on the rails. Extend the rails to the desired length and tighten the nuts.



5. Using a T-25 TORX driver and four screws per rail, attach (but do not tighten) the rack slide rails to the mounting holes on the rack, as shown in the figure.
6. Adjust the distance between the rail brackets on each side of the cabinet to $17 \frac{5}{8}$ inches (44.75 cm). Measure both the front and back.
7. Use a T-25 TORX screwdriver to tighten the screws to 12.0 inch-pounds (13.8 kg-cm) of torque.



8. Using two people to lift it, slide the library into the rack by inserting the chassis slide rails into the rack slide rails, as shown in the figure. Press the spring clips while pushing the library firmly into the rack. When the library is seated properly, you will hear the latch engage.

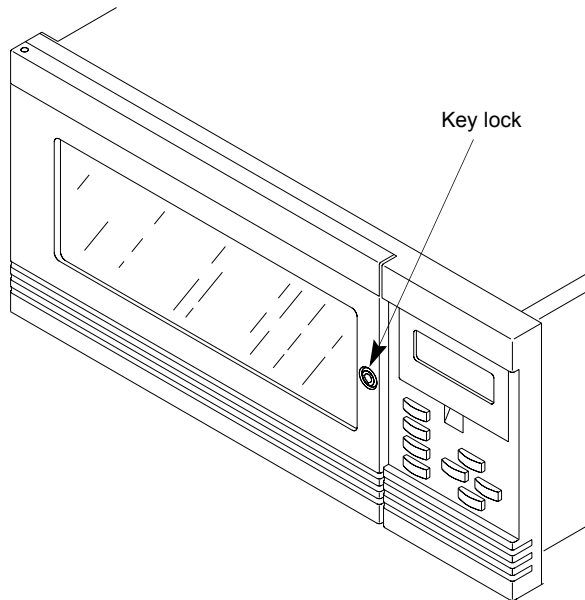


Preparing and installing cartridges

This section describes how to open the library door, remove the packing foam from the cartridge magazine, and install cartridges.

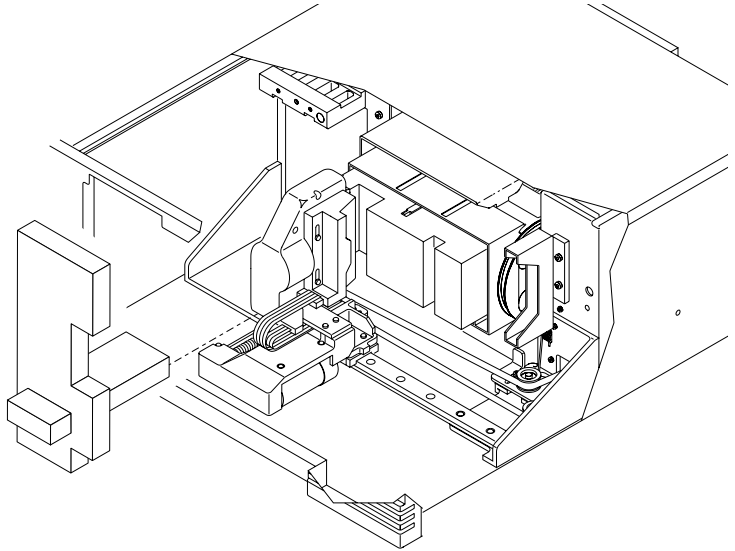
To open the front door:

1. Locate the key from the accessory kit.
2. Insert the key into the lock, push in, and turn the key one-quarter turn to the right.
3. Pull open the door.



To remove the two foam packing pieces:

1. From inside the door, remove the first foam packing piece (rack-mount model shown below).



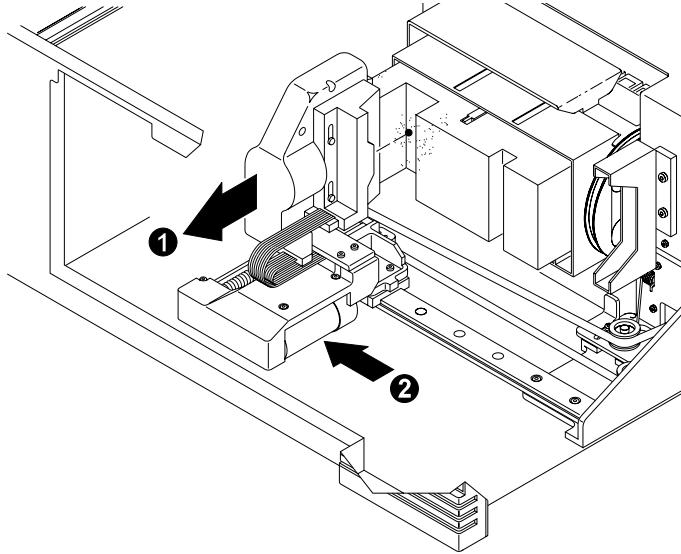
2. To remove the second foam packing piece, you must first move the robot out and away from the magazine, as described on the next page.

➤ **Important** If the robot contains a bar code scanner, do not touch the lens when you move the robot. Smudges on the lens can cause scan errors.

3. When the robot is out of the way, remove the second foam packing piece from the magazine. Save the packing pieces with the other library packing materials.

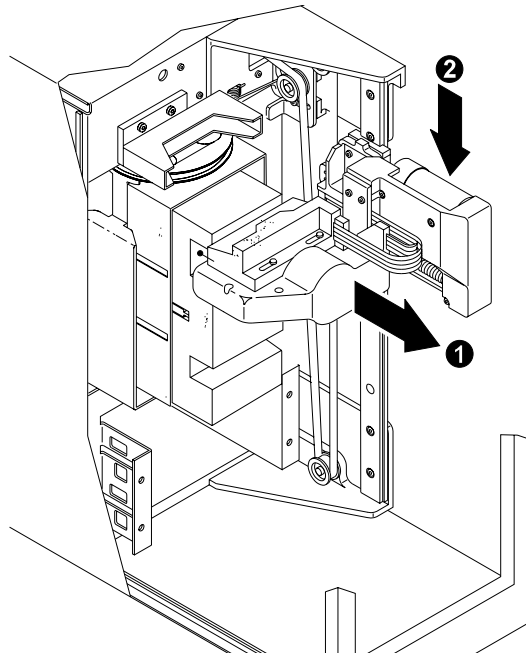
Rack-mount model

- ❶ Pull firmly on the *upper portion* of the robot to slide it back (toward you). Do not pull on the robot base.
- ❷ Push against the robot base, sliding it firmly to the right or left.



Standalone model

- ❶ Pull firmly on the *upper portion* of the robot to slide it back (toward you). Do not pull on the robot base.
- ❷ Push against the robot base, sliding it firmly to the top or bottom.



To prepare and install cartridges:

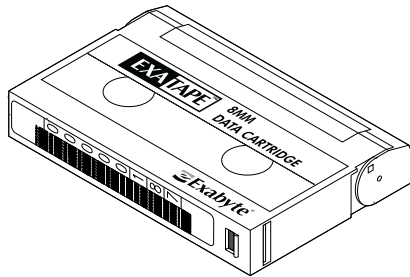
1. Make sure you have the appropriate data cartridges for the type of tape drive installed. See [“Selecting data cartridges” on page 9](#) for more information.

➤ **Important** Because of media management and application software issues, Exabyte recommends that you do not mix AME and MP data cartridges in the library.

CAUTION

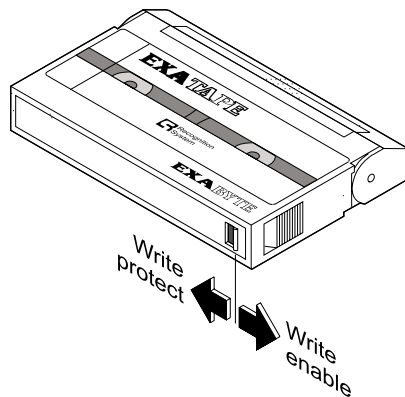
Never use video-grade tape for data storage. Video-grade tape can be less accurate than data-grade tape and is more abrasive to tape drive recording heads. Exabyte strongly recommends that you use Exabyte data-grade media with all Exabyte tape drives. Exabyte media meets specifications that are the most stringent in the industry.

2. If your library is equipped with a bar code scanner, you can affix bar code labels to the cartridges. To do this, position the label using the ridge on the cartridge for guidance. Make sure you orient the label correctly, as shown in the following figure.



➤ **Important** If you remove a bar code label from a data cartridge without replacing it, make sure you clean the label area thoroughly. Bar code labels can leave adhesive on the label area, which may cause the data cartridge to stick to the gripper.

3. Make sure the write-protect switches on the cartridges are set correctly, as shown in the following figure. You can use a ball-point pen or similar instrument to set the write-protect switch. If the red tab fills the window, the cartridge is write-protected.

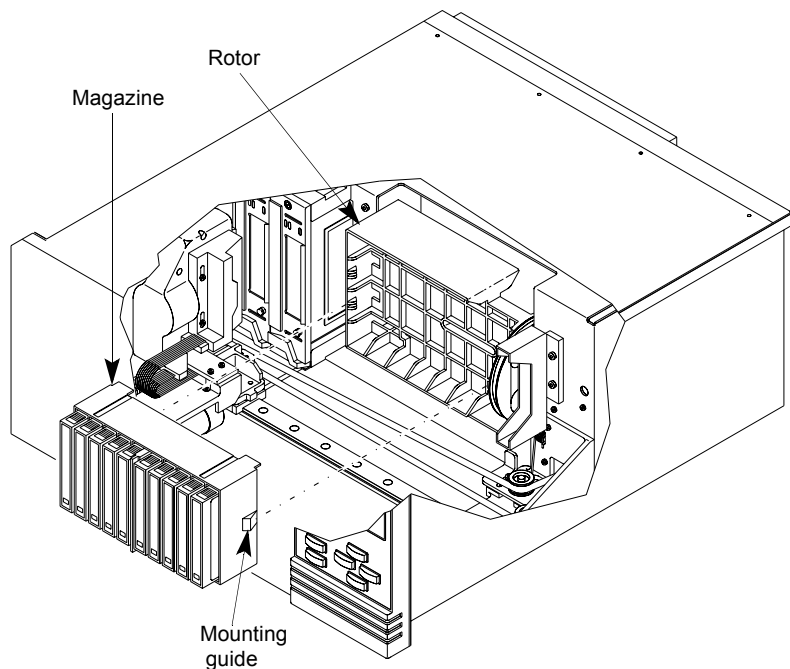


4. Remove the cartridge magazine (shown in the following figure). For rack-mount models, pull it out first from the right, then the left; for standalone models, pull it out first from the top, and then bottom.

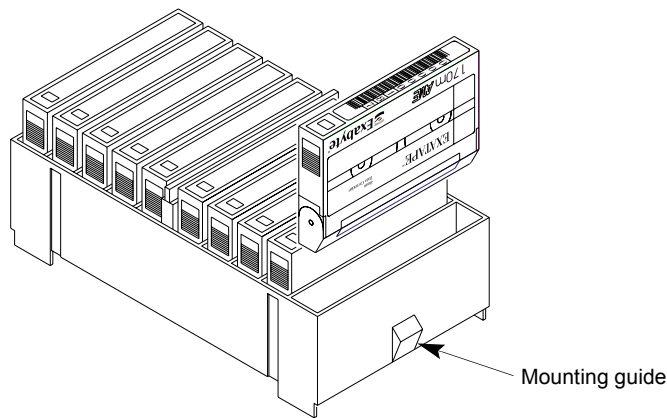
CAUTION

Make sure the robot and its cabling are safely out of the way before you remove or install a cartridge magazine. If the robot is blocking the magazine, move it by following the instructions on [page 20](#).

You can access the back magazine by turning the rotor manually.



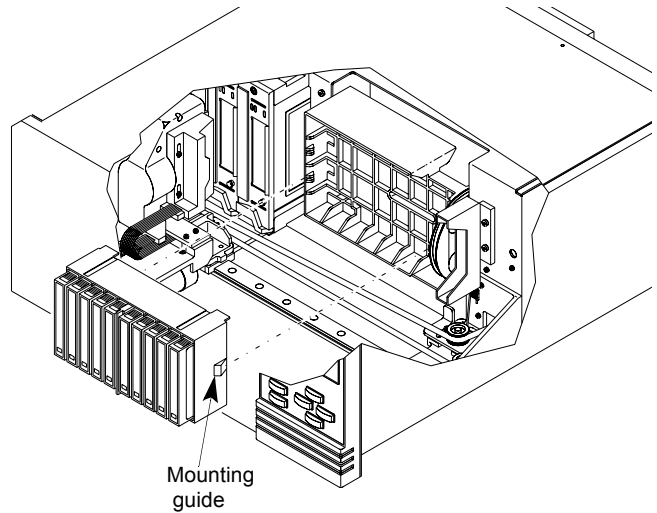
- Note:** Very little force is needed to install a data cartridge. If it does not snap into place easily or if it protrudes further than the magazine's center rib, check the orientation of the cartridge.



Rack-mount model

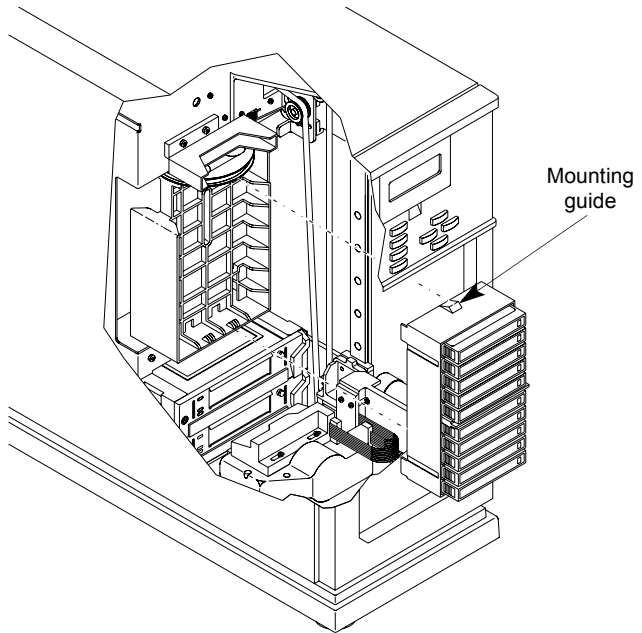
Position the magazine so that the single mounting guide on the magazine is aligned with the roller on the mounting plate.

Clip the magazine onto the left side and then snap the magazine into place by pressing on the right side.

**Standalone model**

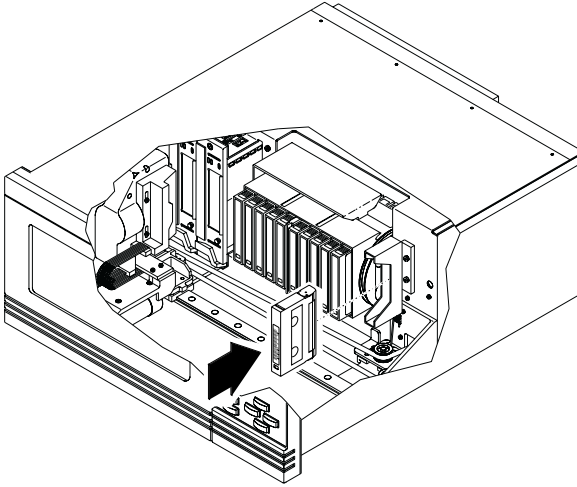
Position the magazine so that the single mounting guide on the magazine is aligned with the roller on the mounting plate.

Clip the magazine onto the bottom, then press on the top.



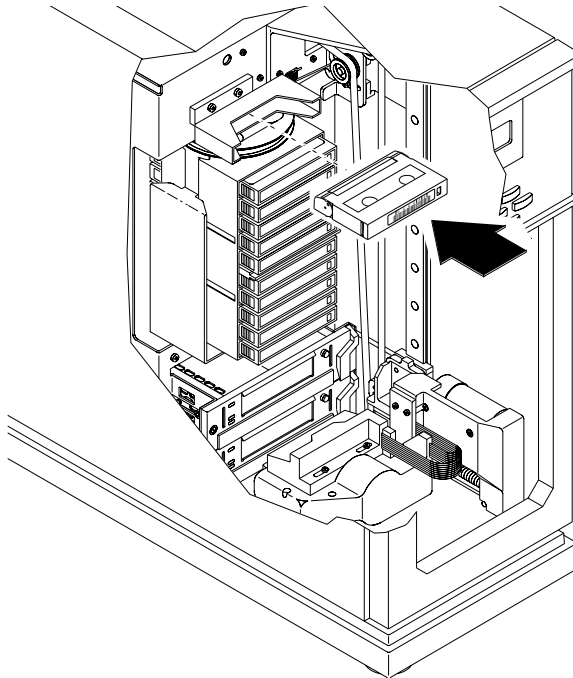
Rack-mount model

Position the cartridge so that the window showing the tape reels is to the right and snap the cartridge into place.



Standalone model

Position the cartridge so that the window showing the tape reels is to the top and snap the cartridge into place.



Connecting the library to the SCSI bus

This section provides general guidelines for connecting the library to the SCSI bus. The library consists of three SCSI devices: the library itself and the two tape drives. If a drive blank is installed, the library consists of two SCSI devices (the drive blank is not addressable). If you are unfamiliar with connecting devices on a SCSI bus, first read [Appendix B](#).

Note: You may receive ferrite beads with the Exabyte 220. Depending on the configuration of the SCSI bus, you may need to install these beads on the SCSI cable to maintain compliance with the CISPR 22B standard. See the instructions packaged with the beads for more information.

Before you begin, be aware of the following:

- The library can operate on one, two, or three SCSI buses. The library, Drive 1, and Drive 2 can operate on separate SCSI buses or on the same SCSI bus.
- You can connect single-ended and low-voltage differential (LVD) SCSI devices to the same bus. Mixing the two types of devices results in all devices on the bus operating as single-ended devices.
- Do not connect a single-ended or LVD device to a high-voltage differential (HVD) SCSI bus.

CAUTION

To avoid damaging devices on the bus, do not connect an LVD library to an HVD SCSI bus.

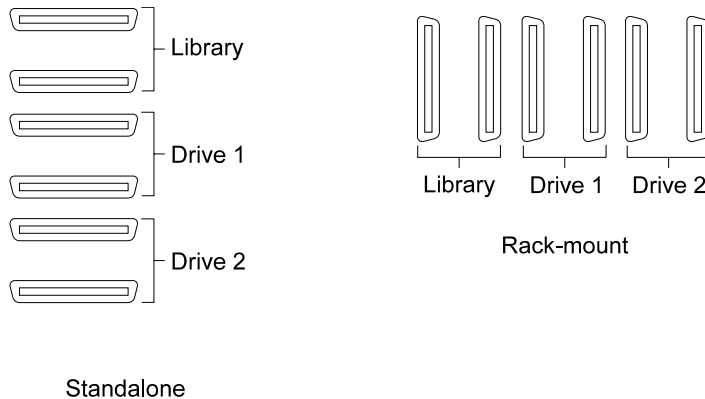
To connect the library to the SCSI bus:

1. Make certain the host computer and any peripheral devices are powered off.

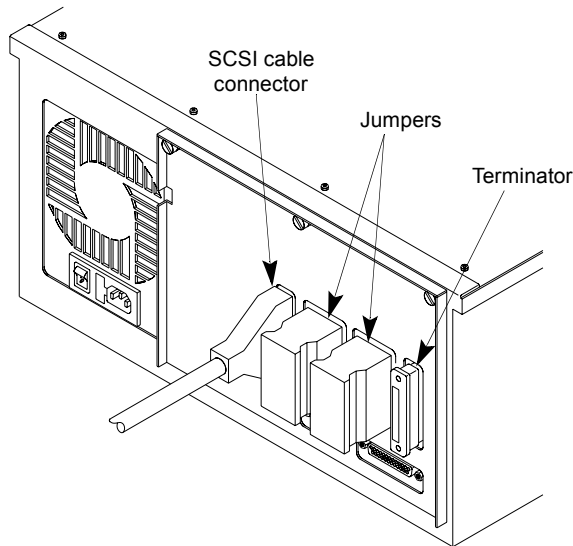
CAUTION

To avoid damaging the tape drives, make sure the tape drives and library are powered off when you connect the library to the SCSI bus.

2. Determine the SCSI bus configuration (that is, how many SCSI buses you will connect to the library and which bus you will connect to which device).
3. Connect the library to the SCSI bus, using the connector assignments shown in the following figure.

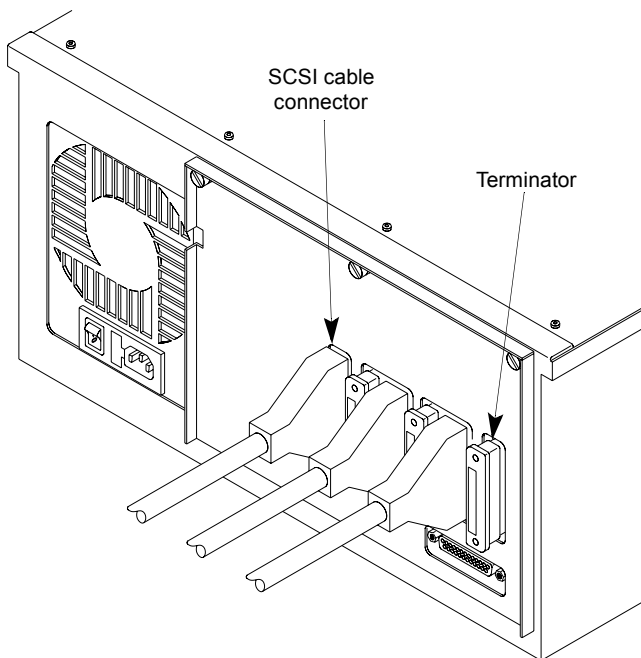


4. If you are connecting the library and two tape drives to one or two SCSI buses, install a jumper (or jumpers) over the connectors between devices, as shown in the example.



5. For each device that terminates the bus (either the library or one of the tape drives), install a terminator on one of the connectors for that device, as shown in the illustration above and on the next page.

The example below shows an Exabyte 220 connected to three SCSI buses. All the buses are terminated.

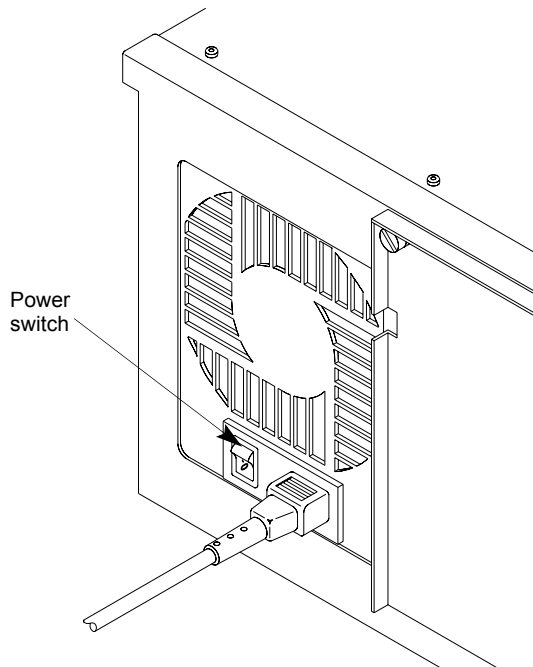


Connecting the power cord

➤ **Important** The power cord shipped with the library is a 120 VAC three-conductor power cord for use in the United States and Canada. If you are planning to use an input voltage other than 120 volts AC or if you plan to use the library outside of the United States or Canada, you must supply your own power cord (see [page 146](#)).

To connect the power cord:

1. Make sure that the power switch on the back of the library is off (the **0** is pressed).



2. Connect the female end of the power cord to the power connector on the back of the library.
3. Plug the male end of the power cord into the power source.

Note: The library has autoranging voltage selection, so you do not need to change the voltage setting.

Powering on the library

To power on the library:

1. Make sure the library's door is closed and locked.
2. Power on the host computer system.

Note: If your host system requires that attached peripheral devices be powered on before the host, power on the library before you power on the host.

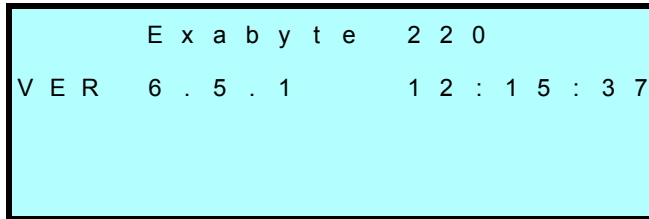
3. Push the power switch on the back of the library to the on position (the **I** is pressed).

Wait while the library performs its power-on sequence. During this time, the following activities occur:

- The cooling fan begins to rotate.
- The library LCD illuminates.
- Each tape drive and the library perform a power-on self-test.

Verifying the hardware installation

After the library powers on, the Main Screen displays on the library's LCD (an example of the Main Screen is shown below). Each tape drive should also show ready status (the drive's LEDs are off).



If the library and tape drives powered on as described above, continue with library configuration in [Chapter 3](#). Before you begin library operation, be sure to follow the steps at end of that chapter to verify that the hardware and software are working together properly.

If the library did not power on as described above, check the following:

- Is the power switch on?
 - Is the power cord inserted correctly?
 - Is the library door closed and locked?
 - Is the SCSI bus terminated?
 - Is the SCSI cable connected to the library and host computer?
 - Is the host computer system turned on?
 - Is there an error code displayed on the library LCD?
- (See Appendix C.)

If you cannot resolve the problem yourself, contact Exabyte (see "Contacting Exabyte" on the inside back cover).

Notes

3 Configuration

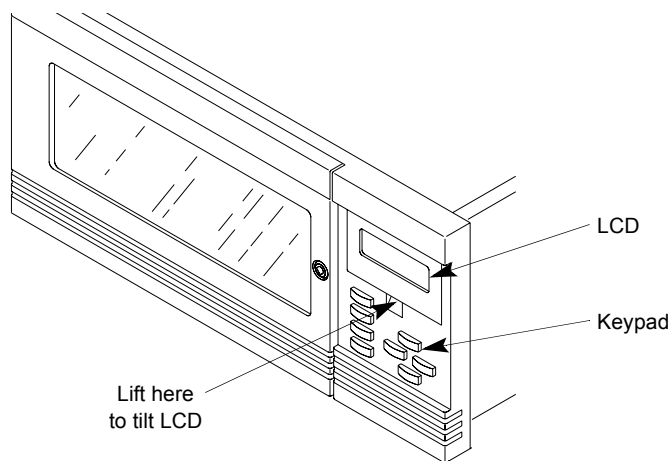
This chapter describes the following:

- Using the operator panel
- Setting configuration options
- Verifying the setup

Be sure to follow the guidelines at the end of this chapter before you begin library operations.

Using the operator panel

The library includes a four-line LCD and keypad, called the *operator panel*, which allows you to interactively control library operations. Using the operator panel (shown in the following figure), you can set library options, check operating statistics, and diagnose errors. If desired, you can tilt the LCD for easier viewing.



Operator keys

Use the operator keys to perform the following actions:

Key	Description
W Z	Scrolls the screen arrow (→) up or down through the menus or selections. The screen arrow points to the current selection.
A S	In some screens, moves the screen arrow left or right. On some menu selections, toggles an option on or off.
	Displays the Help screen. To exit Help, press  .
	Returns to the previous menu or screen; cancels an operation without saving changes; or if the Main Screen is displayed, goes to the Main Menu.
	Selects the item next to the screen arrow or accepts a change.
	Displays the Reset screen, which allows you to reset the library. See page 72 for more information.

Main Screen

The Main Screen appears when you apply power to the library. The first and second lines on the Main Screen identify the product name, firmware version, and time. The third and fourth lines display status information about the library or tape drive; and if a hardware error occurs, these lines display information about the error.

An example of the Main Screen with a status message is shown below.

```
      E x a b y t e    2 2 0
V E R   6 . 5 . 1      1 2 : 1 5 : 3 7
S t a t u s :   M o v e   1 - D R I V E
P i c k i n g   F r o m   S l o t   1
```

Error codes

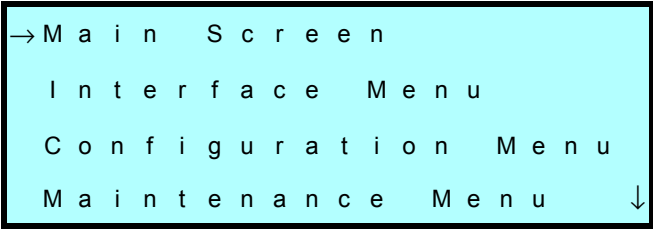
If a hardware error occurs, an error code will appear automatically on the third and fourth lines of the Main Screen. You must correct the error before operation can continue. (Refer to [Appendix C](#) for help in diagnosing and correcting errors.)

The third line provides the error's numerical code; the fourth line provides a brief explanation of the error.

```
      E x a b y t e    2 2 0
V E R   6 . 5 . 1      1 2 : 1 5 : 3 7
S t a t u s :   E r r o r   1 1
S O U R C E   E M P T Y
```

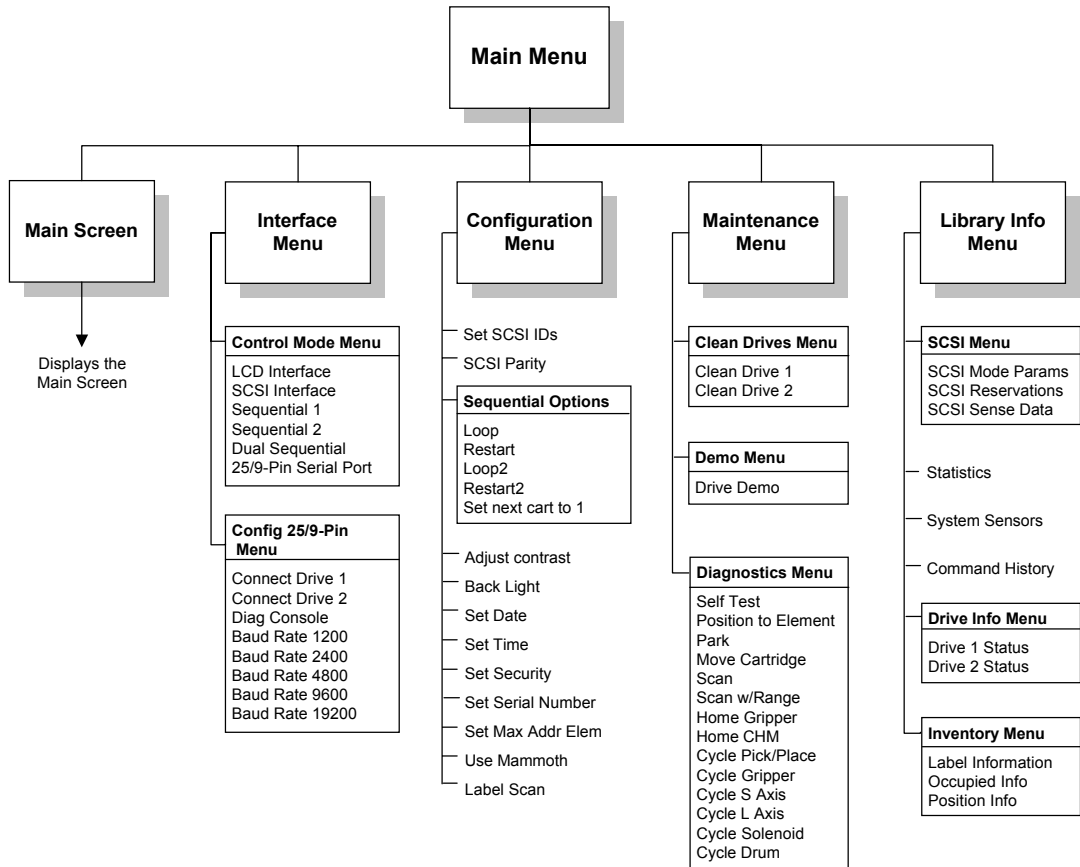
Main Menu

To access the Main Menu, press Escape from the Main Screen. The Main Menu is shown below:



The selections on the Main Menu are described in the following table. The menu structure is shown on the next page.

Main Menu selections	
Main Screen	Returns to the Main Screen.
Interface Menu	Allows you to specify how robot motion is controlled and how to configure the serial ports.
Configuration Menu	Allows you to set SCSI IDs, security, and other configuration options.
Maintenance Menu	Allows you to clean the tape drive and perform diagnostics.
Library Information Menu	Provides tape drive status information and diagnostic information for service technicians.



Setting configuration options

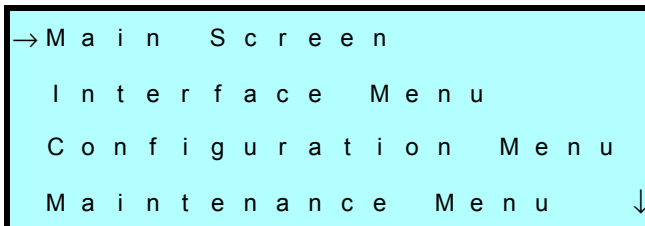
This section describes how to set configuration options for the library. See the following table for an overview of the options and determine which ones you need to change. Instructions for changing the options begin on the next page.

Configuration option	Description
Set SCSI IDs	Allows you to change the default SCSI IDs.
SCSI Parity	Allows you to enable parity checking for the library.
Sequential Options	Specifies options for sequential control mode (if you intend to operate the library as a stacker device). For instructions, see page 61 .
Adjust Contrast	Controls the brightness of the LCD lettering.
Back Light	Turns the LCD background on or off.
Set Date	Sets the system date for the library.
Set Time	Sets the system time for the library.
Set Security	Sets library security.
Set Serial Number	Allows you to change the serial number entered in the library firmware (if it does not match the serial number label on the back of the library).
Set Max Addr Elem	Allows you to decrease the number of cartridge storage slots your library uses and reports (for software with limited cartridge licenses).
Use Mammoth	Tells the library that MammothTape drives are installed.
Label Scan	Tells the library to scan bar code labels on power up or to rescan labels when the door is opened.

Displaying the Configuration Menu

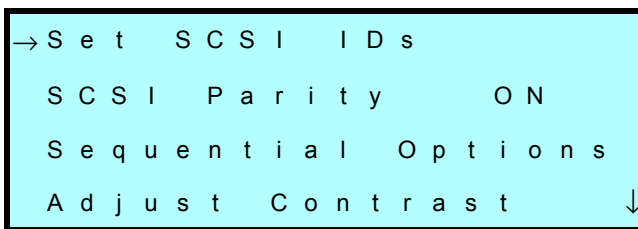
The configuration options are located in the Configuration Menu. To display this menu:

1. Access the Main Menu by pressing **[Escape]** on the keypad. The Main Menu is shown below.

A screenshot of the Main Menu screen. It has a light blue background with a black border. The text is black and spaced out. At the top left, there is a right-pointing arrow followed by 'Main Screen'. Below that are four menu options: 'Interface Menu', 'Configuration Menu', and 'Maintenance Menu', each followed by a downward-pointing arrow. The 'Configuration Menu' option is highlighted with a black arrow pointing to it from the left.

```
→ M a i n   S c r e e n
   I n t e r f a c e   M e n u
   C o n f i g u r a t i o n   M e n u
   M a i n t e n a n c e   M e n u   ↓
```

2. Press Z until the screen arrow points to the Configuration Menu. Then press **[Enter]**. The Configuration Menu appears.

A screenshot of the Configuration Menu screen. It has a light blue background with a black border. The text is black and spaced out. At the top left, there is a right-pointing arrow followed by 'Set SCSI IDs'. Below that are four menu options: 'SCSI Parity ON', 'Sequential Options', and 'Adjust Contrast', each followed by a downward-pointing arrow. The 'Set SCSI IDs' option is highlighted with a black arrow pointing to it from the left.

```
→ S e t   S C S I   I D s
   S C S I   P a r i t y       O N
   S e q u e n t i a l   O p t i o n s
   A d j u s t   C o n t r a s t   ↓
```

Setting the SCSI IDs

Default SCSI IDs are assigned at the factory for the library and each tape drive. Drive blanks are assigned B (for blank). This section describes how to view the default settings and change them if necessary.

➤ **Important** The library and tape drives must each have a unique SCSI ID within each SCSI bus. Because you may have multiple buses, the library does not check for duplicate SCSI IDs. It is your responsibility to make sure you do not assign duplicate IDs within a bus.

To view or change the SCSI IDs:

1. From the Configuration Menu, select Set SCSI IDs. The following screen appears.

S C S I	D 2	D 1	L I B
I D s :	3	2	1
	↑		
	↓		→

2. To set the SCSI ID for Drive 2 (farthest from the magazine), press W or Z until the screen displays the correct SCSI ID.
3. Press S to move the screen arrows to Drive 1.
4. To set the SCSI ID for Drive 1 (closest to the magazine), press W or Z until the screen displays the correct SCSI ID.
5. Press S to move the screen arrows to LIB.
6. To set the SCSI ID for the library, press W or Z until the screen displays the correct SCSI ID.
7. When the SCSI IDs for both tape drives and the library are correct, press **Enter** to accept your choices.

8. If you have changed one or more of the tape drive IDs, the system displays a confirmation message. Press **(Enter)**. The system resets the tape drives with changed IDs and returns to the Configuration Menu.

Setting SCSI parity

The SCSI Parity option allows you to enable parity checking for the library (if the SCSI adapter card connected to the library supports it). When this option is enabled, the library checks all data coming across the SCSI bus for parity. The setting remains in effect across power cycles.

Note: Parity checking for the library can also be enabled by the application software using the SCSI command, MODE SELECT. The method used last to set parity checking (LCD or SCSI command) has precedence. Parity checking for tape drives is set separately.

To set the SCSI Parity option:

1. From the Configuration Menu, select SCSI Parity.
2. Press S and A to toggle parity checking on and off.

Adjusting the contrast

To control the brightness of the lettering on the LCD:

1. From the Configuration Menu, scroll down to Adjust Contrast.
2. Press S or A to set the desired contrast.

Adjusting the back light

To turn the LCD background on or off:

1. From the Configuration Menu, scroll down to Back Light.
2. Press  or  to turn back lighting on or off.

Setting the date

To set the system's date:

1. From the Configuration Menu, select Set Date. The Set Date screen appears.
2. Use the  and  keys to move across columns, then press  or  to change the selected values.

The date you set appears on the Command History screen and on diagnostic listings.

Setting the time

To set the library system time:

1. From the Configuration Menu, select Set Time. The Set Time screen appears.
2. Use the  and  keys to move across columns, then press  or  to change the selected values.

The time you set also appears on the Command History screen and on diagnostic listings.

Setting library security

The Security option allows you to prevent unauthorized personnel from disrupting the operation of the library. When you enable security, the following activities are prevented:

- Changing SCSI IDs
- Changing SCSI parity checking
- Changing the control mode
- Changing the library serial number
- Using the Diagnostics Menu and the Demo Menu
- Using the Clean Drives Menu
- Opening the front door (operator panel security only)
- Changing the installed tape drive model
- Communicating with a tape drive across a serial port

If you attempt to perform any of the above operations when security is enabled, the library displays a message that states security is active. The message also states whether security was enabled from the operator panel or by the application with a SCSI command.

Methods for enabling and disabling security

Security can be enabled or disabled in either of two ways:

- You can set the security option from the operator panel using the Configuration Menu, as described in this section.
- The application software can issue a SCSI MODE SELECT command to turn security on or off (see your software documentation or the *EXB-210 and EXB-220 8mm Libraries SCSI Reference*).

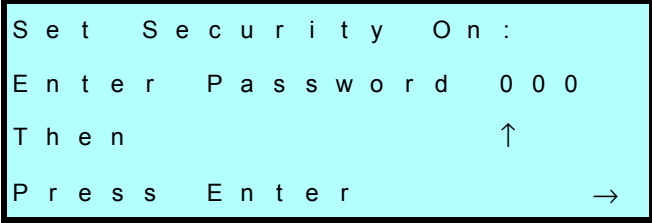
Whichever method is used to enable security (operator panel or SCSI) must also be used to disable security. That is, if you enable security from the operator panel, you must disable it from the operator panel. If security is enabled by the application (SCSI), it must be disabled by the application.

Note: To determine if security has been set by your application, look at the SCSI Mode Parameters screen (see [page 99](#)).

Security remains in effect across resets.

Enabling security from the operator panel

1. From the Configuration Menu, select Set Security On. The following screen appears.



```
Set Security On :
Enter Password 000
Then           ↑
Press Enter    →
```

Note: If the menu displays Set Security Off, the security option has already been enabled.

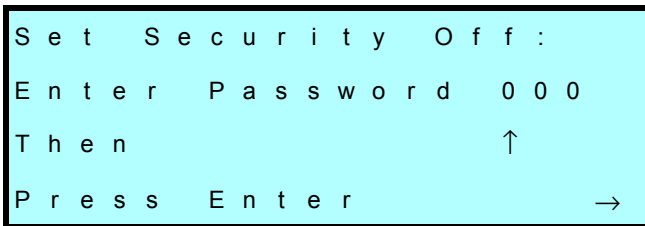
2. Select a three-digit password. Press S and A to move from column to column and W and Z to change the numbers. (The default password is 000.) When you are finished, press **Enter**.

➤ **Important** You must use the same password to turn security off.

3. A confirmation message appears. Press **Enter**. Or, to exit without saving the password, press **Escape**.

Disabling security from the operator panel

1. From the Configuration Menu, select Set Security Off. The following screen appears.



```
S e t   S e c u r i t y   O f f :  
E n t e r   P a s s w o r d   0 0 0  
T h e n                               ↑  
P r e s s   E n t e r                               →
```

Note: If the menu displays Set Security On, the LCD security function is disabled. However, security may have been enabled by your application using a SCSI command. If so, it must be disabled by your application. Refer to your software documentation or to the *EXB-210 and EXB-220 8mm Libraries SCSI Reference*.

2. To specify the three-digit password, press S and A to move from column to column and W and Z to change the numbers. When you are finished, press **Enter**.

If you enter the wrong password, the system displays an error message. If you forget the password, try entering the default password (000). If the default password has been changed and you do not know what it is, call your service provider.

Verifying the serial number

If desired, check the Set Serial Number option and verify that it is the same as the serial number label on the back of the library. If necessary, change the serial number on the screen so it matches the label. The serial number entered in this screen appears on diagnostic listings.

To change the serial number:

1. From the Configuration Menu, select Set Serial Number. The Serial Number screen appears.
2. Use the  and  keys to move across columns, then press  or  to change the selected values.

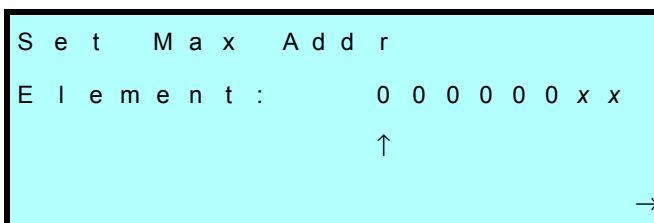
Setting the Maximum Addressable Element option

Some software applications have a scalable license that limits the number of cartridge slots the library can process. If you have a limited software license, use the Maximum Addressable Element option to set the highest slot number your library can use and report to the software. If your software does not monitor the number of slots you are using, you do not need to set this option. (Refer to your software documentation for more information.)

The default value for the Maximum Addressable Element is 20, which is the highest cartridge slot that can store a cartridge (the slot numbering begins at slot 0 and ends at slot 20, for a total of 21 slots). Refer to “Element indexes” on [page 88](#) for information about how the cartridge slots are numbered.

To set the Maximum Addressable Element value:

1. From the Configuration Menu, scroll down until the screen arrow is pointing to Set Max Addr Elem and press **Enter**. The following screen appears.



In the example above, *xx* is the current setting for the Maximum Addressable Element option.

2. In the Set Max Addr screen, enter the highest number of cartridges your software license supports. For example, if the software supports 16 cartridges, you need to enter 15 (slot numbering starts at 0). Use the **←** and **→** keys to move the screen arrow under the digit you want to change. Then use the **↑** or **↓** keys to change the selected digit.
3. Press **Enter**. The library prompts you for confirmation. If the number is correct, press **Enter**.

Setting the Use Mammoth option

When Mammoth and M2 drives are installed in the library, the Use Mammoth option must be turned on. To verify that the Use Mammoth setting is turned on:

1. From the Configuration Menu, scroll down to Use Mammoth. "ON" should display next to the option.
2. If necessary, press S or A to toggle the option.

Setting the Label Scan option

If your software application does not automatically scan bar code labels when the library powers up or when the door is opened and closed, make sure the Label Scan option is turned on.

To verify that the Label Scan option is turned on:

1. From the Configuration Menu, scroll down to Label Scan.
2. If necessary, press S or A to toggle the option.

Checking the setup

After you install the library hardware (described in [Chapter 2](#)) and configure the library (described in this chapter), check the setup by performing the suggested exercises below. While these exercises are not required, it is a good idea to verify that your software and hardware are properly communicating before you begin operations.

- Use the options on the Demo Menu or Diagnostic Menu to exercise the hardware. This determines whether the library hardware components are operating properly. See [“Performing hardware exercises” beginning on page 88](#) for instructions.

Note: These hardware exercises require changing the control mode, as described on [page 56](#). When you complete the exercises, be sure to change the library’s control mode back to SCSI, which is the standard operating mode for the library.

- If you have not already done so, install the software application on the host computer. Instruct the software to load some cartridges into the tape drive. This determines whether the software and library are communicating properly.
- Back up several megabytes of data and perform a comparison check on the backed up data. (If you have two tape drives, back up several megabytes to both.) This determines whether the software and tape drives are communicating properly.

If the library and tape drives are not operating as expected, see [Chapter 6](#) for troubleshooting information. If there is an error code displayed on the LCD, see Appendix C. If you cannot resolve the problem yourself, contact Exabyte (see “Contacting Exabyte” on the inside back cover).

Beginning library operations

Before you begin library operations, check the following:

- At least one cartridge magazine is installed.
- The robot gripper does not contain a cartridge.
- The library door is closed and locked.
- The library is in the proper control mode.
SCSI is the standard operating mode (see [“Setting robot control modes” beginning on page 53](#)).

When you have successfully completed the hardware installation and library configuration, use the application software to perform backup and restore operations automatically. During normal library operations, you do not need to intervene in the cartridge processing. However, for occasional tasks you may need to perform, refer to [Chapter 4](#), “Library Operation,” and [Chapter 5](#), “Tape Drive Operation.”

Notes

4 Library Operation

This chapter describes the following library operations you may occasionally need to perform:

- Setting robot control modes
- Operating the library in sequential mode
- Replacing data cartridges
- Storing cartridges
- Resetting the library

Note: The application software automatically controls the library's robotics to perform backup and restore operations. You do not need to intervene in the cartridge processing; however, you may need to occasionally perform the tasks described in this chapter.

Setting robot control modes

To determine which interface will control robot motion, you can set the library to one of the following control modes: SCSI Interface, Sequential 1, Sequential 2, Dual Sequential, LCD Interface, and 25/9-Pin Serial Port.

These control modes allow you to operate the library with the application software (SCSI Interface), operate the library as a sequential stacker device (Sequential 1, Sequential 2, Dual Sequential), or perform diagnostic functions on the library (LCD Interface or 25/9-Pin Serial Port).

Note: Control mode settings remain through power cycles.

Control modes are described below and on the next page. Refer to [page 56](#) for instructions on changing the control mode.

SCSI Interface mode

If you want the application software to control library operations, you must set the library to SCSI Interface mode. In this standard operating mode, the application software controls the motion of the robot by issuing SCSI commands across the SCSI bus.

Note: The application software can issue commands to the library regardless of the control mode. However, the library must be in SCSI Interface mode for the application software to control robot motion.

For detailed information about SCSI commands, refer to the *EXB-210 and EXB-220 8mm Libraries SCSI Reference*.

Sequential modes

If you want the library to run as a sequential stacker device, you can specify one of three sequential modes:

- Sequential 1
- Sequential 2
- Dual Sequential

In these modes, the application software does not need to provide support for library functions, only for the tape drives. For detailed information about the sequential modes, see [“Operating in sequential mode” beginning on page 57](#).

LCD Interface mode

If you want to perform any operations from the operator panel that involve moving the robot, you need to set the library to LCD Interface mode. All of these operations, such as cleaning the tape drives and performing diagnostics, are included under the Maintenance Menu.

Note: LCD Interface mode is required only when you want to control the motions of the robot. For example, you do not need to switch control modes to access the menus.

25/9-Pin Serial Port mode

When the library is operating in 25/9-Pin Serial Port mode, you can control the motions of the robot from a remote console program connected to the library’s 9-pin or 25-pin port.

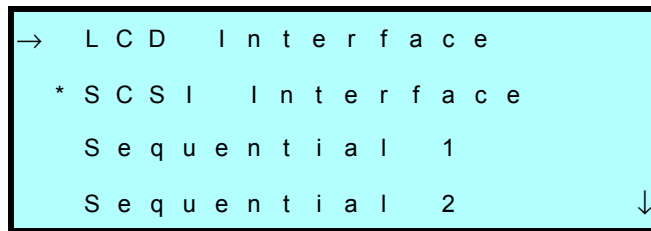
Note: Use the 25/9-Pin Serial Port mode to control robot motion only. You do not need to change the control mode to access a tape drive’s firmware.

For more information about how to use the 25-pin and 9-pin serial ports, see [page 115](#).

Changing the control mode

To change the control mode:

1. Make certain the library is in the ready state (for example, no hardware errors, the door is closed, and so on).
2. If the security option has been enabled, disable it (see [page 47](#)).
3. From the Main Menu, select Interface Menu.
4. From the Interface Menu, select Control Mode Menu. The following screen appears.



Note: Some of the Sequential options may not appear in this menu if only one drive is installed.

5. Select the desired mode. The current control mode is indicated with an asterisk (*).

➤ **Important** When the library is in LCD Interface mode or 25/9-Pin Serial Port mode, the software application cannot control robot movement.

6. When the library displays a confirmation message that it has changed the control mode, press **Escape** to return to the Control Mode Menu.

Operating in sequential mode

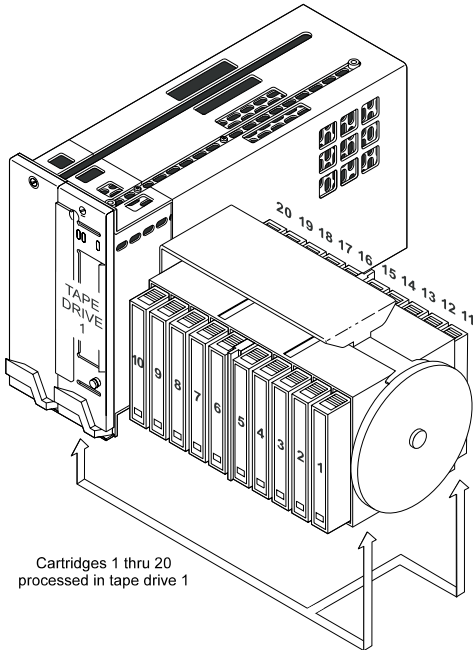
When the library is operating in one of the sequential modes, its internal firmware instructs the robot to move cartridges sequentially between the cartridge slots and one or both tape drives. Sequential modes are useful with software applications that support functions performed by tape drives but not functions performed by library robotics.

In Sequential 1 and Sequential 2 modes, the robot moves cartridges between the slots and only one of the tape drives. These are the single sequential modes. In Dual Sequential mode, the robot moves cartridges between the slots and both tape drives. Half of the cartridges are processed in tape drive 1 and half in tape drive 2.

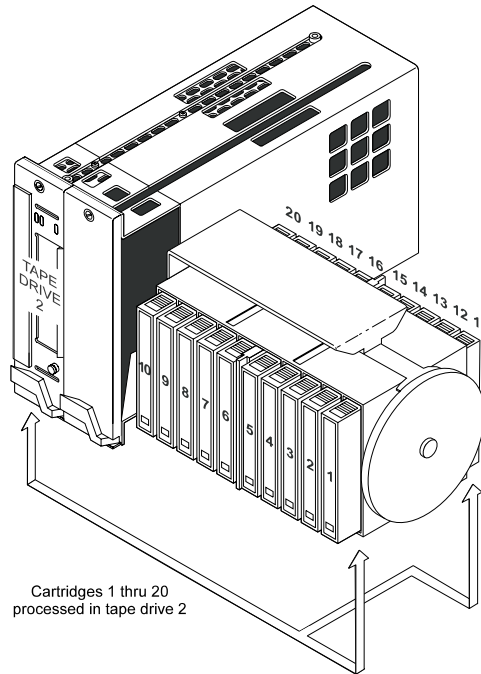
Sequential 1 and Sequential 2 modes

Sequential 1 and Sequential 2 modes provide efficient sequential operation when you have just one tape drive installed. In these modes, the robot picks cartridges sequentially from the slots and processes them in one tape drive. (The fixed cartridge slot is not included.)

In Sequential 1 mode, the library processes the cartridges in tape drive 1 (closest to the magazine). In Sequential 2 mode, the library processes the cartridges in tape drive 2 (farthest from the magazine). Both magazines are included in the cartridge processing (20 slots).



Sequential 1 Mode



Sequential 2 Mode

In Sequential 1 and Sequential 2 modes, the library performs the following steps:

1. Picks the cartridge from slot 1 and places it in tape drive 1 for Sequential 1 mode or tape drive 2 for Sequential 2 mode. If the slot is empty, the robot picks the next cartridge in the magazine.

2. Waits until the tape drive ejects the cartridge, then returns the cartridge to its original slot.
3. Repeats these steps for the next cartridge until it has processed all of the cartridges.
4. Returns to the first cartridge and begins the process again or stops, depending on how the Loop option is set. The Loop option is described on [page 63](#).

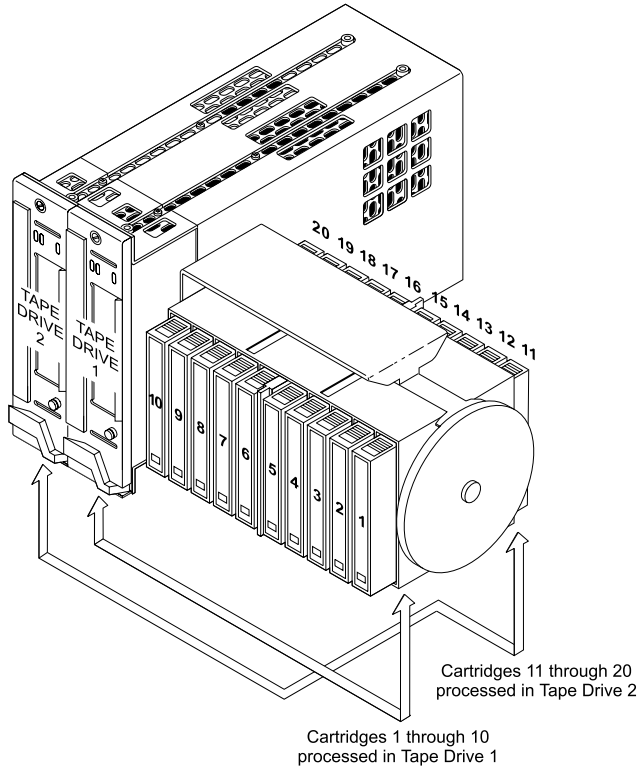
Note: For Sequential 1 mode, tape drive 1 must be installed; for Sequential 2 mode, tape drive 2 must be installed. The library cannot switch to the other tape drive. If both drives are installed, the library ignores the additional drive.

Dual Sequential mode

In Dual Sequential mode, the robot moves cartridges between the slots and both tape drives. Half of the cartridges are processed in tape drive 1 and half in tape drive 2.

The cartridges are processed in both tape drives simultaneously. The sequences are independent of each other and are controlled by separate loop and restart options.

The library sequentially processes cartridges from slots 1 through 10 (magazine 1) in tape drive 1 and processes cartridges from slots 11 through 20 (magazine 2) in tape drive 2.



Dual Sequential Mode

In Dual Sequential mode, the library performs these steps:

1. Picks the cartridge from slot 1 and places it in tape drive 1.
2. Picks the cartridge from slot 11 and places it in tape drive 2.
3. Waits for either tape drive to eject its cartridge, then returns the cartridge to its original slot. Picks the next cartridge in that sequence and places it in the corresponding tape drive.
4. Repeats step 3 until either sequence is finished.
5. Returns to the beginning of that sequence and starts processing it again or stops processing that sequence, depending on how the Loop option for the finished sequence is set. The Loop options are described on [page 63](#).
6. Continues processing the other sequence until it is finished. Either returns to the beginning of that sequence or stops, depending on the setting of the Loop option for that sequence.

Sequential options

For Sequential 1 and Sequential 2 modes, you can set the Restart and Loop options. For Dual Sequential mode, you can set the Restart, Restart2, Loop, and Loop2 options. These options are not affected by a reset or power cycle.

Restart options

The Restart options determine where the library restarts after it is reset or power cycled, or after the door is opened and closed. The library can restart either at the beginning of the cartridge sequence or where it left off when the interruption occurred.

Before the library restarts... Before restarting, the library performs the following actions:

- 1. If the robot was moving a cartridge, it finishes the move. (This includes inserting the cartridge into the tape drive if the robot was moving a cartridge to a tape drive.)

Note: If you attempt to open the door, the library will not release the door interlock until it has completed the move.

- 2. The library performs a power-on self-test (POST). If you opened the door, the library performs its POST after you close the door.
- 3. If a cartridge is in a tape drive, the robot waits for the cartridge to be ejected, then returns it to its original slot.

As shown in the following tables, the Restart options determine what the library does next.

Sequential 1 or Sequential 2 mode

If Restart is...	The library...
On	Restarts at slot 1.
Off	Resumes where it left off.

Dual Sequential mode The two Restart options in Dual Sequential mode correspond to the slots in each magazine: Restart applies to slots 1 through 10 in magazine 1, while Restart2 applies to slots 11 through 20 in magazine 2. The Restart options operate independently of each other; one sequence (slots 1-10 or 11-20) can restart while the other resumes where it left off.

If Restart is...	and Restart2 is...	the library...	
		(for slots 1-10)	(for slots 11-20)
On	On	Restarts at slot 1.	Restarts at slot 11.
	Off		Resumes where it left off.
Off	On	Resumes where it left off.	Restarts at slot 11.
	Off		Resumes where it left off.

Loop options

The Loop options determine what the library does after it has finished processing the last cartridge in a sequence. As shown in the following tables, the library can either loop back to the first cartridge in the sequence and start processing the cartridges again or stop and wait for operator intervention. (Operator intervention typically means opening the library's door, removing the cartridge magazine, installing a new magazine, and closing the door.)

Sequential 1 or Sequential 2 mode

If Loop is...	the library...
On	Returns to cartridge 1 and starts processing the cartridges again.
Off	Stops processing cartridges and waits for operator intervention.

Dual Sequential mode The two Loop options in Dual Sequential mode correspond to the slots in each magazine: Loop applies to slots 1 through 10 in magazine 1, while Loop2 applies to slots 11 through 20 in magazine 2. The Loop options operate independently of each other; one sequence can loop back to the beginning while the other sequence stops.

If Loop is ...	and Loop2 is...	the library...	
		(for slots 1-10)	(for slots11-20)
On	On	Starts processing cartridges 1-10 again.	Starts processing cartridges 11-20 again.
	Off		Stops processing cartridges and waits for operator intervention.
Off	On	Stops processing cartridges and waits for operator intervention.	Starts processing cartridges 11-20 again.
	Off		Stops processing cartridges and waits for operator intervention.

Resetting sequential processing

If you want to resume sequential processing from the first cartridge, select “Set Next Cart to 1” from the Sequential Options menu.

Avoiding interruptions

Although the library has effective methods for resuming operation, it is best to avoid interruptions when the library is operating sequentially. In particular:

- **Do not reset or power cycle the library unless absolutely necessary.** Reset the library only to clear certain error conditions and power off the library only to perform maintenance or to store it. Avoid resetting or power cycling the library when a cartridge is in a tape drive or the robot.
- **Do not open the door unless absolutely necessary.** During operation, open the door only to replace the magazine after the library has processed all the cartridges. Never force the door. The library will not release the door until it has completed a cartridge move or load already in progress. Certain applications may also prevent the door from being opened.
- **Do not remove a cartridge from a tape drive or insert a cartridge into a tape drive.** If you want to remove a cartridge, wait until the robot has placed it in the magazine before removing it. If you want to add a cartridge, add it directly to the magazine.

Replacing data cartridges

This section describes how to:

- Open the library door to access the cartridges
- Replace a single cartridge
- Replace a cartridge magazine

Note: See [page 9](#) for information about selecting the appropriate cartridges.

Opening the library door

To access the cartridges, you must first open the library door.

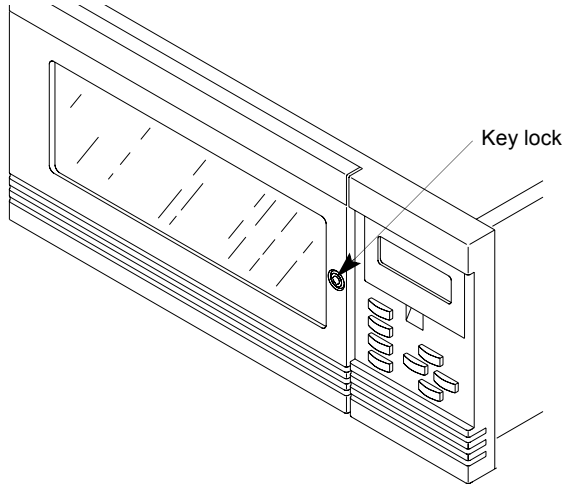
➤ **Important** During library operation, do not open the library door unless you need to remove and replace cartridges or perform a maintenance operation. After the door has been opened and then closed, your backup application may perform a time-consuming cartridge inventory process, in addition to the library's own power-on self-test.

To open the door:

1. Insert the key into the lock (see the following figure), push in, and turn it one-quarter turn to the right.

When the robot finishes the current operation and moves to the park position, the door's interlock mechanism releases.

2. When the interlock mechanism releases, open the door.



CAUTION

Do not force the door open. The door's interlock mechanism may be prevented from releasing by security or by the application software.

Replacing a single cartridge

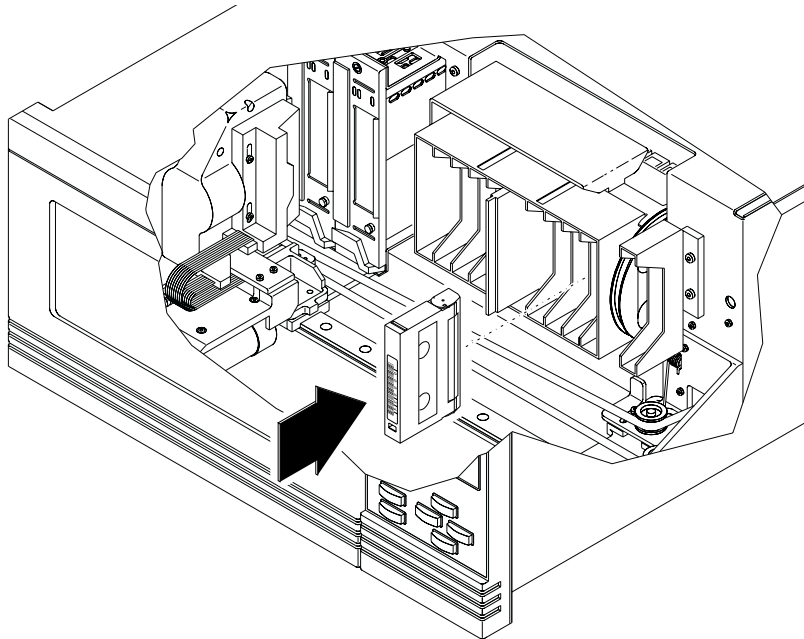
To replace a single cartridge:

1. Remove the cartridge by pulling it straight out from its slot in the cartridge magazine. You can access the back magazine by turning the rotor manually.
2. Make sure that the write-protect switch on the replacement cartridge is set correctly for the desired operation. If the red tab fills the window, the cartridge is write-protected.

3. For rack-mount models, hold the cartridge so that the write-protect switch is down; for standalone models, hold it so the switch is to the right. Insert the cartridge into the empty slot, as shown in the following figure.

Note: Very little force is needed to install a cartridge into the cartridge magazine. If the cartridge does not snap into place easily, check its orientation.

4. Close and lock the library's door.

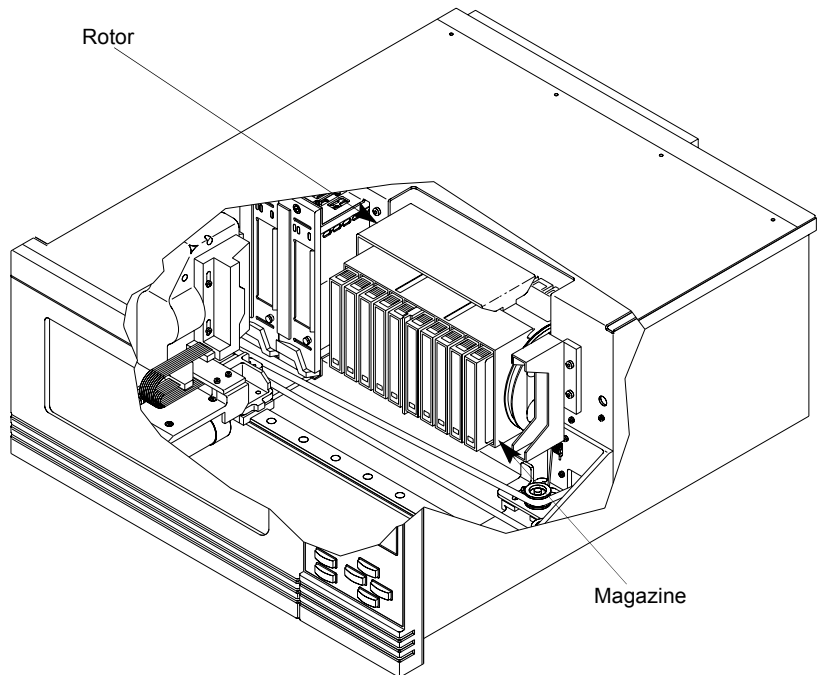


Replacing a cartridge magazine

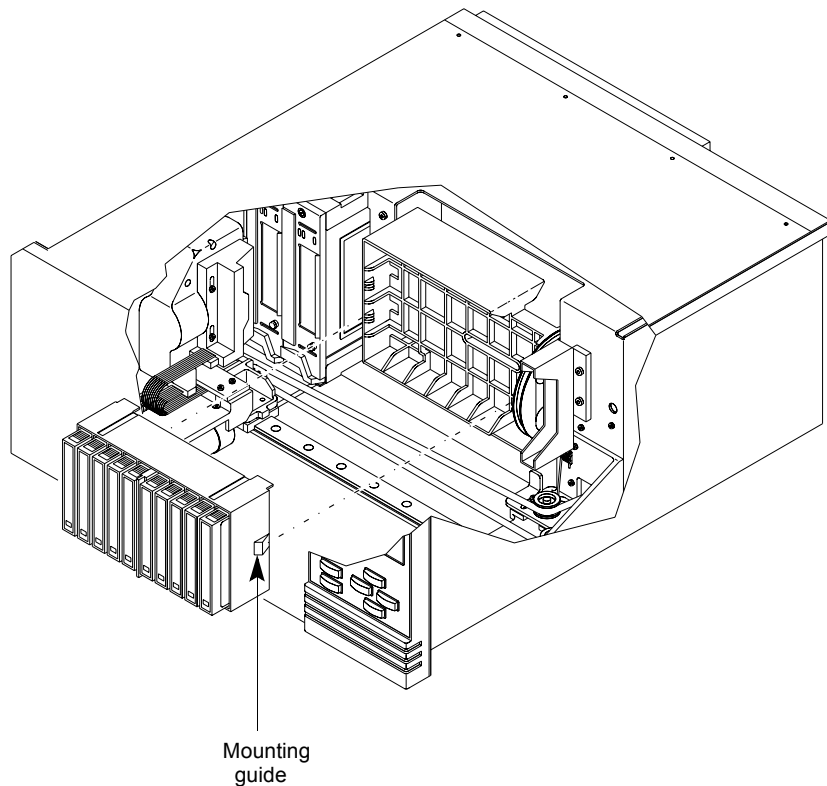
➤ **Important** Use only magazines designed for Exabyte 220 libraries.

To replace a cartridge magazine:

1. For rack-mount models, remove the cartridge magazine by pulling it out first from the right, then the left. For standalone models, pull it out first from the top, then the bottom. You can access the back magazine by turning the rotor manually.



2. If desired, replace the cartridges (see the illustration on [page 24](#)).
3. Position the magazine so that the single mounting guide on the magazine is aligned with the roller on the mounting plate, as shown in the figure. For rack-mount models, clip the magazine onto the left side and snap it into place by pressing on the right side. For standalone models, clip the magazine onto the bottom and snap it into place by pressing on the top.



4. Close and lock the door.

Storing cartridges

To maximize the shelf life of your tapes and ensure data integrity, follow these guidelines when storing cartridges:

- **Store cartridges in a suitable environment.** Follow the specifications for storage temperature and other environmental requirements, as described on the cartridge packaging. Do not allow the temperature and humidity in the storage environment to fluctuate.
- **Keep the storage location as free of airborne particulates as possible.** To eliminate obvious sources of particulates, do not permit anyone to smoke, eat, or drink near the storage area, and do not store cartridges near a copier or printer that may emit toner and paper dust.
- **Store cartridges with the write-protect switch in the protected position** (see [page 22](#)).
- **Store cartridges as soon as possible** after you remove them from the library. Immediate storage helps avoid many of the conditions that can damage tapes, such as temperature and humidity fluctuation, particulate contamination, and excessive handling.
- **If possible, store cartridges in a cartridge magazine.** In the cartridge magazine, cartridges are protected from airborne contaminants by a clear plastic cover. With the cover in place, the magazines can be stacked on top of each other to make the most efficient use of storage space.

Resetting the library

If the library encountered an error and is still not operating after you tried the corrective action for the error, you may need to reset the library. A reset causes the library and the drives to perform their power-on self tests. Unless configured otherwise, the tape drives rewind the tape after a reset, but do not eject the cartridge.

CAUTION

Before resetting the library, make sure the library or tape drives are not communicating across the SCSI bus. Resetting the library and tape drives may disrupt communications on the SCSI bus.

To reset the library, you can use one of the following methods:

- Press **Reset** on the operator panel, then press **Enter** at the confirmation screen (or press **Escape** to cancel).
- Perform a power-on reset by turning the library off, then back on.
- Perform a remote hardware reset by plugging a cable into the remote reset port on the back of the library and press a reset button on the cable (see [Appendix A](#) for cable specifications).

Note: The library, tape drives, or the entire SCSI bus can also be automatically reset by the host.

When the library is reset, both the library and tape drives perform power-on self-tests, then the Main Screen appears on the LCD.

Note: If the library is performing a cartridge move operation when it is reset, it completes the move operation before it performs the power-on self-test.

5 Tape Drive Operation

This chapter describes how to perform the following tasks:

- Monitoring the tape drive LEDs
- Cleaning tape drives
- Resetting a tape drive
- Displaying information about tape drives
- Ejecting a cartridge manually

Note: The application software automatically controls the tape drives to perform backup and restore operations. You do not need to intervene in the cartridge processing; however, you may need to occasionally perform the tasks described in this chapter.

Monitoring the tape drive LEDs

The following table shows the tape drive LED states and the conditions they indicate.

LED states	Condition
All LEDs on	The tape drive was reset or it is performing its power-on self-test.
Top LED on	Cleaning required.*
Top LED flashing	Hardware error.
Middle LED on	A tape is loaded and the tape drive is ready to perform tape motion activities.
Bottom LED flashing	Tape motion. A fast flash indicates high-speed tape motion.

* For the M2 tape drive, manual cleaning is required when standard AME media has been used extensively in the drive.

Note: You may see other LED activity (random flashing, steady on, and so on). For a detailed description of the drive’s LED states, refer to the product specification for your tape drive (available in viewable, PDF format at www.exabyte.com).

Cleaning the tape drives

You should clean the drives whenever the library displays “Drive needs cleaning” on the Main Screen of the LCD or whenever your application software notifies you. (Not all software applications display cleaning requirements.) Regular cleaning helps ensure that the tape drives function reliably. If `MUSTCLN` displays on the Status screen, the drive will not perform write or read functions until it is cleaned.

Note: Some software applications automatically perform tape drive cleaning. If your application software supports automatic cleaning, store a cleaning cartridge in the magazine slot specified by the application. Refer to the documentation for your software.

For the cleaning operation, use an Exabyte Mammoth Cleaning Cartridge or a cleaning cartridge approved by Exabyte (see [page 10](#)). To order cleaning cartridges, contact Exabyte (see “Contacting Exabyte” on the inside back cover).

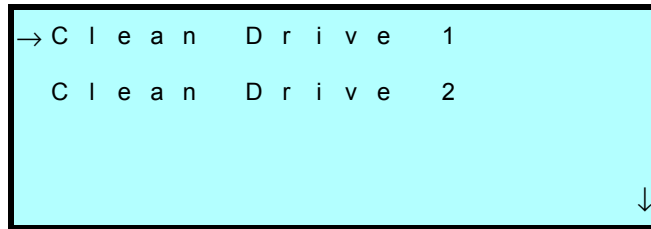
If M2 drives are installed in the library and you use AME with SmartClean cartridges exclusively, the M2 tape drive automatically performs the cleaning operation using the cleaning material in the cartridges. If you do not use SmartClean cartridges exclusively, the M2 drive may require regular cleaning as described in the following sections.

CAUTION

Using cloth swabs, cotton swabs, cleaning agents, or cleaning cartridges not approved for your tape drive by Exabyte may void the tape drive warranty.

To clean the tape drive from the operator panel:

1. Make certain a cleaning cartridge is installed in the fixed cartridge slot. (If the fixed slot contains a data cartridge and you follow these steps, you will have to manually eject the data cartridge from the tape drive.)
2. If security has been enabled, disable it (see [page 47](#)).
3. Switch to LCD Interface mode (see [page 53](#)).
4. From the Main Menu, select Maintenance Menu. Then select Clean Drives Menu. The following screen displays.



5. Select the tape drive you want to clean. Drive 1 is the tape drive closest to the magazine; Drive 2 is the tape drive farthest from the magazine. When you select a drive, the following activities occur:
 - The robot picks the cleaning cartridge from the fixed slot and inserts it in the tape drive you specified.
 - The tape drive automatically performs the cleaning process and ejects the cartridge when the process is complete (in several minutes).
 - The robot automatically picks the cartridge from the tape drive and replaces it in the fixed cartridge slot.

6. Confirm that the cleaning was completed by looking at the drive's LCD. The `ClnSoon` or `MustCln` message should be gone. Or, you can look at the LEDs on the front of the tape drive. The tape drive's top LED should be off.
7. If the LCD still displays `ClnSoon` or `MustCln` or the tape drive's top LED is still lit, replace the cleaning cartridge and clean the tape drive again. If the message still displays on the LCD or the tape drive LED is still on after the second cleaning, there may be a problem with the tape drive.

➤ **Important** If the tape drive ejects the cleaning cartridge immediately after loading it and the LCD displays the message `Depleted`, you need to replace the cleaning cartridge. To order cleaning cartridges, contact Exabyte (see "Contacting Exabyte" on the inside back cover).

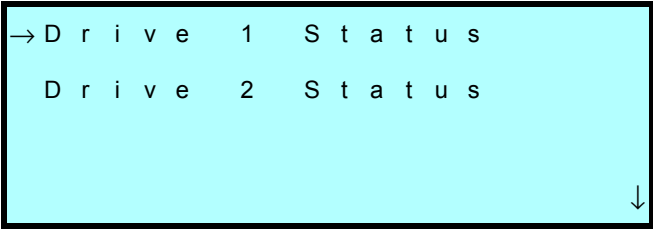
8. When the cleaning is complete, return the library to its original control mode (SCSI Interface mode or one of the sequential modes) and enable security.

Displaying information about tape drives

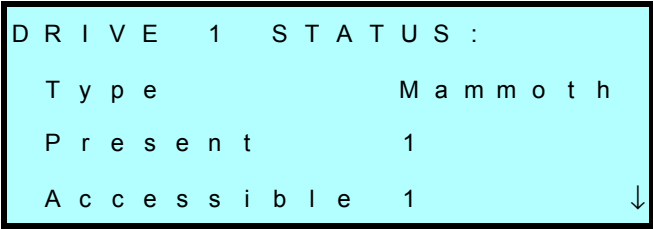
From the operator panel, you can display information about the tape drives, including the type of tape drive installed and its operational status. The information screens are updated whenever there is a change in drive status.

To display tape drive information:

- 1. From the Main Menu, select Library Info Menu. Then select Drive Info Menu. The following screen appears.



- 2. Press W or Z to select the desired tape drive and press **Enter**. A Drive Status screen appears, similar to the following example.



The following table describes the information in the Drive Status screen.

Drive Status screen	
DRIVE / STATUS	Identifies the tape drive, as follows: Drive 1 – The tape drive closest to the magazine. Drive 2 – The tape drive farthest from the magazine.
Type	Identifies the tape drive model. Note: If <i>8mm</i> appears, it indicates one of the following conditions: ▪ No tape drive is present in that slot. ▪ A tape drive firmware error has occurred. ▪ A Mammoth or M2 tape drive is installed, but the Use Mammoth configuration option is set to OFF.
Present	Indicates whether a tape drive is installed. 0 – A tape drive is not present. 1 – A tape drive is present.
Accessible	Indicates the accessibility of the tape drive to the robot. 0 – A cartridge is loaded in the tape drive or the tape drive's status is unknown. 1 – A cartridge is protruding from the tape drive or the drive is empty.
Clean	0 – The tape drive is clean. 1 – The tape drive needs to be cleaned or the cleaning tape is used up.
Warning	Not currently used.
Occupied	0 – There is no cartridge loaded in the tape drive. 1 – There is currently a cartridge loaded in the tape drive.

Drive Status screen	
Occ Valid (Occupied Valid)	0 – The door has been opened or some other interruption has occurred so the occupied information may not be reliable. 1 – The occupied information is reliable.

The following table shows additional fields on the Mammoth Drive Status screen.

Mammoth Drive Status screen	
Cart	Displays the status of a data cartridge, if any, in this tape drive: ▪ Loaded – A cartridge is in the tape drive and the tape is loaded into the tape path. ▪ Loading – A cartridge is being loaded into the tape drive. ▪ Unloading – A cartridge is being unloaded from the tape drive. ▪ Present – A cartridge is in the tape drive, but the tape is not loaded in the tape path. ▪ Empty – The tape drive does not contain a cartridge.
Tape left	Displays how much tape is left, in megabytes, on the cartridge currently in this tape drive.
Tape size	Displays the total amount of tape, in megabytes, on the cartridge currently in this tape drive.
Tape fmt	Displays the data format of the cartridge currently in the tape drive.
PO sec	Displays the power-on seconds.
MO sec	Displays the tape motion seconds.
Serial	Displays the tape drive's serial number.
BOOT	Displays the code level of the tape drive's boot ROM.

Mammoth Drive Status screen	
FLASH	Displays the code level of the tape drive's flash EPROM.
ENTER = LCD Display	Allows you to switch to the drive's LCD display mode by pressing Enter . (Drive models installed in libraries do not have an LCD.) The third line of the library's LCD will then show additional information that would be displayed on the tape drive's LCD. To return to the Drive Status screen from LCD display mode, press Escape .

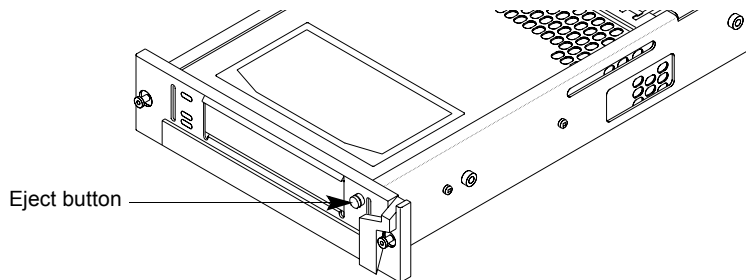
Ejecting a cartridge manually

If a problem occurs that requires intervention, you may need to manually eject a cartridge.

To eject a cartridge:

1. Open the library door (see [page 66](#)).
2. Press the eject button on the tape drive's faceplate.

The following figure shows the location of the eject button.



Notes

6 Troubleshooting and Diagnostics

This chapter provides troubleshooting and diagnostics information for the library, including:

- Troubleshooting installation and operation problems
- Performing library exercises
- Viewing library statistics
- Configuring the serial ports for diagnostics

Troubleshooting installation and operation problems

This section provides a list of suggestions for solving problems that may occur when you are installing and operating the library and the enclosed tape drives.

Note: If an error code is displayed on the LCD, refer to [Appendix C](#). If LEDs on the tape drive are flashing, see [page 74](#).

Problems with library installation

If your library and application software are not communicating after installation and configuration, check the following:

- ✓ **SCSI IDs.** Make sure that the SCSI IDs you selected for the tape drives and library are not the same as the ID used by any other SCSI device on that bus, including the SCSI adapter card. Refer to [page 41](#) for information about setting the SCSI IDs.
- ✓ **SCSI bus connections.** Make sure that you have connected the SCSI cables to the appropriate SCSI connectors on the back of the library. See [page 27](#) and [Appendix B](#) for more information.
- ✓ **SCSI cabling.** Make sure that all SCSI cables are securely connected at both ends.
- ✓ **Single-ended, low-voltage differential (LVD), and high-voltage differential (HVD) devices.** Make sure all devices on the bus are all single-ended or LVD or all HVD. You can connect single-ended and LVD devices to the same bus. However, mixing the two types of devices results in all devices on the bus operating as single-ended devices. These devices include the controller cards, cables, and terminators. Also, do not connect a single-ended or LVD device to an HVD SCSI bus.
- ✓ **Narrow SCSI and wide SCSI.** Make sure all devices within the library are either narrow SCSI or wide SCSI. Do not mix narrow and wide SCSI within the library.
- ✓ **SCSI cable lengths.** Make sure the internal SCSI cabling does not exceed maximum lengths (see [page 153](#)).

- ✓ **Termination.** Make sure your bus is properly terminated as described in [Appendix B](#). If another SCSI device previously terminated the SCSI bus and is no longer at the physical end of the bus, be sure to remove the terminators from that device.
- ✓ **Compatibility.** Make sure that your tape drive and library are compatible with the SCSI adapter card and application software you plan to use.
- ✓ **SCSI adapter card installation.** Make sure that you installed your SCSI adapter card correctly. Refer to the documentation that came with your card for installation and troubleshooting instructions. Pay special attention to steps describing setting various jumpers and switches on the card. Make sure that the card is properly seated.
- ✓ **Software installation.** Make sure that your application software is installed correctly. Refer to the documentation that came with your software. Pay special attention to steps describing configuring the software for use with the library and tape drives.
- ✓ **Control mode.** Make certain the library is operating in the correct control mode. For most applications, the control mode should be set to SCSI Interface. See [page 56](#) for more information.

After checking the items above, reset the library as described on [page 72](#).

Problems with tape drive operation

If you have been successfully operating the application software and library in the past, but are now experiencing problems reading and writing data, check the following:

- ✓ **Write-protect switch.** If you are writing data, make sure the cartridge is write enabled (move the write-protect switch toward the edge of the cartridge).
- ✓ **Cartridge type.** If you are writing data with Exabyte Mammoth tape drives, use AME data cartridges. If you have M2 tape drives, use AME with SmartClean data cartridges. (For more information, see [page 9](#).) Because of media management and application software issues, do not mix MP and AME data cartridges in the library. If you must mix cartridge types, contact your software vendor.
- ✓ **Cartridge age.** If the cartridge has been in use for a long time or if it has been used frequently, try using a new cartridge.
- ✓ **Cleaning.** Clean the tape drive as described on [page 75](#). Make sure you are using the recommended cleaning cartridge for your tape drive.
- ✓ **Use Mammoth option.** Make sure that the Use Mammoth configuration option is set to ON. Otherwise, the library will not be able to receive information from the drive (see [page 49](#)).

Problems with library operation

If the library has been successfully operating in the past, but is now experiencing problems, check the following:

- ✓ **Control mode.** If you are using an application software package to control robot operations, the library must be set to SCSI Interface mode. See [page 54](#) for more information. If you are trying to operate the library in one of the sequential modes, be sure to read [“Operating in sequential mode” on page 4-57](#).
- ✓ **Security.** Make sure that security is set correctly for the operation you are trying to perform. If security is enabled, you cannot perform many operations on the LCD and you cannot open the door. Security can be enabled from the operator panel (see [page 46](#)) or from your application software with a SCSI command.
- ✓ **Door open.** Make sure the door is closed and locked. You can check the Door Closed and Key Lock lines on the System Sensors screen to determine if the door and key lock sensors are properly working (see [page 106](#)).
- ✓ **Robot operation.** You can use the selections in the Diagnostics Menu and the Demo Menu (described later in this chapter) to determine if the robot is functioning properly.
- ✓ **Fuse.** Make sure the fuse is good (see [page 121](#)).

Performing hardware exercises

This section describes hardware exercises you can perform from the operator panel. Many of the tasks may be necessary if you want to test library hardware operations.

Hardware exercises are available from the Demo Menu and Diagnostics Menu. The Demo Menu provides options for running the library in a continuous demo mode, where the robot randomly moves cartridges between slots and tape drives. The Diagnostics Menu provides options for performing specific robot movements.

Note: You can also perform diagnostics using the library's internal firmware, which resides in the flash EEPROM. This firmware also allows you to upgrade to new library firmware and print a diagnostic listing. For information, see the maintenance manual for your library.

Using elements

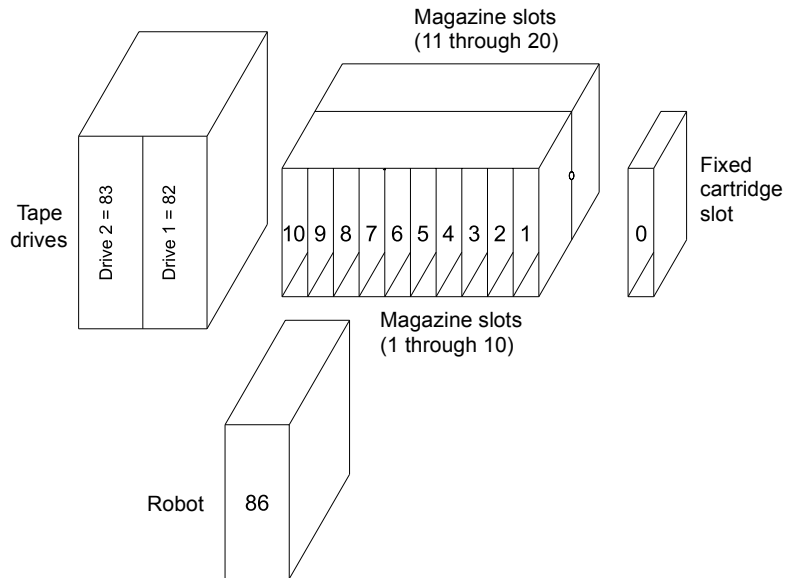
Elements are the physical locations in the library that can accept a cartridge (the robot, the magazine slots, the fixed slot, and the two tape drives).

Element indexes

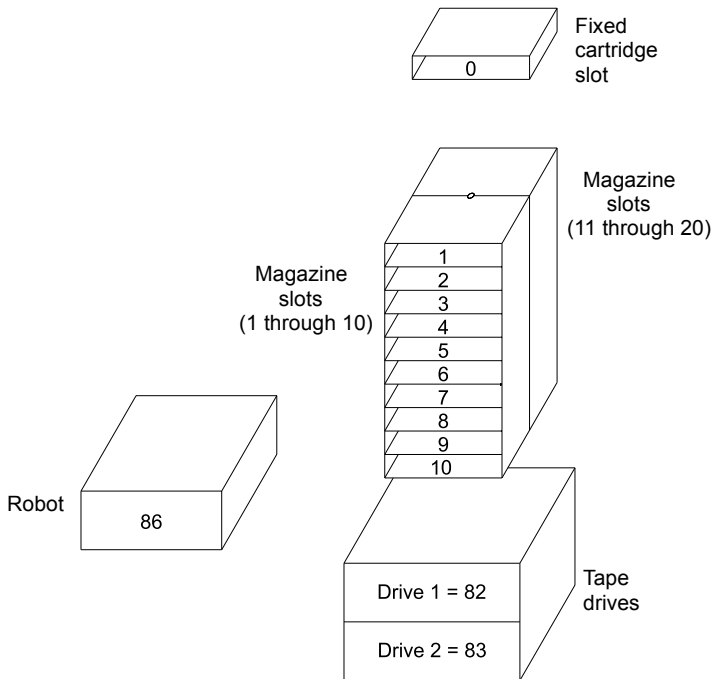
Each element has an *element index*, which enables the library to identify the elements. Many LCD functions require you to use element indexes. For example, to move a cartridge using the Diagnostics Menu, you must specify the source and destination element indexes. The *source* is either a cartridge slot or the tape drive where the robot will pick a cartridge. The *destination* is either the slot or the tape drive where the robot will place the cartridge.

The following diagrams show the element indexes assigned for the library.

Indexes for the rack-mount model



Indexes for the standalone model



Element addresses

Your application software may use *element addresses* to identify elements in the library. The difference between an element index and an element address is that an index is a fixed number set by the library, whereas an address can be changed by your application software (using the SCSI command, MODE SELECT).

The element indexes correspond to the library's default element addresses. To verify the current element addresses, display the SCSI Mode Parameters screen (see [page 97](#)).

Using the Demo Menu

The Demo Menu option causes the robot to randomly move cartridges from slot to slot, including the fixed cartridge slot.

To run the demo option:

1. If necessary, disable security (see [page 47](#)).
2. Change the control mode to LCD Interface (see [page 53](#)).
3. Make sure there is at least one data cartridge present and one empty slot before you begin the test.
4. From the Main Menu, select Maintenance Menu. The Demo Menu appears.
5. Select Slot Demo from the Demo Menu.
6. The library asks if you want cartridges scanned during the demo. If your library is equipped with a bar code scanner and you want to include bar code scanning in your demo, select YES. Otherwise, select NO.

The system begins the demo cycles and displays the following screen:

```

S L O T   D E M O :
    T o t a l   M o v e s :   n
S t a t u s :   M o v e   n n - n n
  
```

In the previous example, *n* indicates the number of moves that have run so far, and *nn - nn* indicates the source and destination element indexes of the current move.

- 7. To abort the demo, press **[Escape]**, then **[Enter]** at the next screen. The library displays the total number of cycles that were run during the demo and an Error 91 message, indicating that you have aborted the demo.

Using the Diagnostics Menu

The Diagnostics Menu provides basic exercising functions for components in your library.

Starting diagnostics

Before performing diagnostic exercises from the operator panel, do the following:

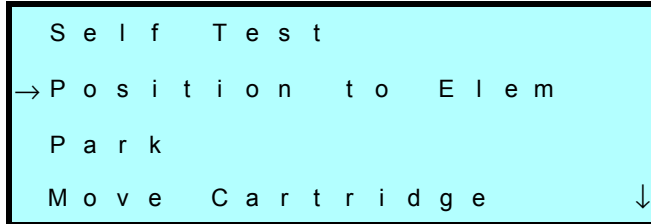
- 1. If necessary, disable security (see [page 47](#)).
- 2. Change the control mode to LCD Interface (see [page 56](#)).

Refer to the table below for the element indexes. These numbers correspond to the library components and are necessary for some tests.

Library Component	Element Index
Fixed cartridge slot	0
Cartridge slots	1 to 20 (see pages 89 and 90)
Tape drive 1	82
Tape drive 2	83
Robot	86

Performing diagnostic tests

1. From the Main Menu, select Maintenance Menu, then select Diagnostics Menu. A screen of diagnostic tests appears.



2. Select one of the tests. (Each test is described in the table starting below.)
3. When the test is finished, the screen displays Status Complete and you can press **Escape** to return to the Diagnostics Menu.

Note: If you want to abort a test in progress, press **Escape**, then **Enter**.

The following table describes each test and also provides additional instructions for performing the tests (if applicable).

Test	Description	Additional instructions
Self Test	Causes the robot to do the following: ▪ Perform a Home CHM test. ▪ Cycle the short axis once. ▪ Cycle the long axis once. ▪ Move the robot to home position.	
Position to Elem	Positions the robot in front of a tape drive, fixed cartridge slot, or a magazine slot.	When you select Position to Elem, another screen appears that requires you to press W or Z to select the element index where you want to position the robot, then press Enter .

Test	Description	Additional instructions
Park	Moves the robot to the park position (at the top of the long axis for the standalone model or the right of the long axis in the rack-mount model).	
Move Cartridge	Moves a cartridge from one location to another. Important: Do not insert a cartridge in a tape drive. The tape drive will not automatically eject the cartridge.	When you select Move Cartridge, the Set Source screen appears. Press Z or W to select the source index (the slot you want the robot to pick from), then press Enter . The Set Destination screen appears. Press Z or W to select the destination index (the slot where you want the robot to place the cartridge), then press Enter .
Scan	If your library is equipped with a bar code scanner, the Scan test scans all the elements. If your library is not equipped with a bar code scanner, the robot will touch the cartridges and update the cartridge inventory.	After the system scans all the elements, it stores the data in the cartridge inventory and displays any scan errors on the Label Information screen (see page 109).
Scan with Range	If your library is equipped with a bar code scanner, the Scan with Range test scans a range of bar code labels. If your library is not equipped with a bar code scanner, the robot will touch the cartridges and update the cartridge inventory.	When you select Scan with Range, the Set Scan Start screen appears. Press Z or W to specify an element index where you want the scanner to begin, and press Enter . The Set Scan Stop screen appears. Press Z or W to specify an index where you want the scanner to stop, and press Enter . After the system scans the labels, it stores the data in the cartridge inventory and displays any scan errors on the Label Information screen (see page 109).

Test	Description	Additional instructions
Home Gripper	Causes the gripper to move to its home position (open). This test also recalibrates the home or zero position for the gripper.	
Home CHM	Causes the robot (cartridge handling mechanism — CHM) to retract on its short axis, move to the home position (the top of the long axis for standalone models or to the right for rack-mount models), move in front of the tape drives, then open and close its gripper This test also recalibrates the home or zero position for the long axis, the short axis, the gripper, and the home position for the drum.	
Cycle Pick/Place	Causes the robot to take a cartridge from a specified element and replace it in the same location.	When you select Cycle Pick/Place, the Set Source screen appears. Press Z or W to select the source index (where you want the robot to pick and place the cartridge). The Set Cycles screen appears. Press Z or W to select the number of cycles you want this test to run and press Enter .
Cycle Gripper	Causes the robot gripper to open and close the number of times you specify.	When you select Cycle Gripper, the Set Cycles screen appears. Press Z or W to select the cycles for the Cycle Gripper test to run and press Enter .
Cycle S Axis	Causes the robot to move end to end along the short axis (the axis on which the robot moves in and out).	When you select Cycle S Axis, the Set Cycles screen appears. Press Z or W to select the number of cycles you want the Cycle S Axis test to run and press Enter .

Test	Description	Additional instructions
Cycle L Axis	Causes the robot to move end to end along the long axis (the axis on which the robot moves left and right for the rack-mount model or up and down for the standalone model).	When you select Cycle L Axis, the Set Cycles screen appears. Press Z or W to select the number of cycles you want the Cycle L Axis test to run and press Enter .
Cycle Solenoid	Exercises the solenoid that controls the locking mechanism on the front door.	When you select Cycle Solenoid, the Set Cycles screen appears. Press Z or W to select the number of cycles you want the Cycle Solenoid test to run and press Enter . You will hear a click each time the solenoid extends and retracts.
Cycle Drum	Rotates the drum assembly 180 degrees.	

Viewing library statistics

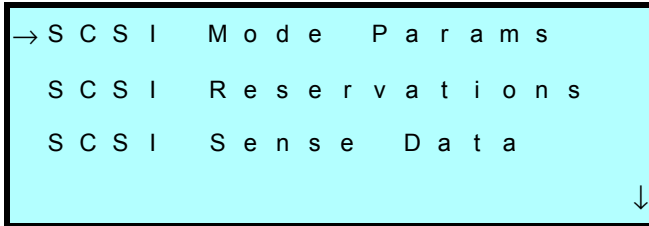
The functions in the Library Information Menu are mainly for use by technical support and application developers. You may be asked by technical support to display one of these screens and locate information that will help troubleshoot a problem.

This section describes the following library information:

- SCSI Menu (mode parameters, reservations, and sense data)
- Statistics (data about robot operations and elements)
- System sensors (data about the library’s mechanical sensors)
- Command history (contents of the history buffer)
- Inventory Menu (data about bar code labels and elements)

Viewing SCSI data

SCSI information is available through the SCSI Menu. To display this menu, select Library Info Menu from the Main Menu, then select SCSI Menu. The following menu appears.



SCSI Mode parameters

The SCSI Mode Parameters screen displays the settings of various operating mode parameters. These parameters are equivalent to the parameters reported by the library in response to a MODE SENSE command, issued by the application software. Typically, the values of these parameters are changed by a MODE SELECT command. For more information about the MODE SENSE and MODE SELECT commands, refer to the *EXB-210 and EXB-220 8mm Libraries SCSI Reference*.

To view these parameters, select SCSI Mode Params from the SCSI Menu. The following screen appears.

E L E M E N T A D D R P A G E :			
C H M	A d d r ,	C u r	8 6
C H M	A d d r ,	D e f	8 6
C H M	A d d r ,	S a v	8 6 ↓

For each parameter, the SCSI Mode Parameters screen shows the current (Cur), default (Def), and saved (Sav) values:

- The *current* value is the value currently active. It is either the power-on default or a temporary value set by the latest MODE SELECT command.
- The *default* value is the original value set at the factory.
- The *saved* value is the value specified as the power-on default by a MODE SELECT command. After a saved value has been specified with a MODE SELECT command, this value takes effect immediately and each time you power on the library.

The table below describes the items on the SCSI Mode Parameters screen.

SCSI Mode parameters	
CHM Addr*	The element address of the robot (cartridge handling mechanism — CHM).
Stor Addr*	The element address of the first storage location, which is the fixed cartridge slot. See pages 89 and 90 for a complete numbering scheme.
Drive Addr*	The element address of the first tape drive (closest to the magazine). The other tape drive is numbered consecutively.
Drive Num	The number of tape drives installed.
Parity	Whether SCSI parity checking is enabled for the library. When the parity option is on, the library checks all data coming across the SCSI bus for parity.
Pty Retry	The number of times the library will retry a SCSI phase after detecting a parity error.

SCSI Mode parameters	
Security	Whether security has been enabled by SCSI or not. (Security also can be enabled from the operator panel; see page 46 for more information.)
Wr Line 1 <i>through</i> Wr Line 4	Whether the text displayed on each of the four lines on the Main Screen is defined by the LCD Mode page in SCSI.

* When set to their default values, the element addresses reported on this screen are the same as element indexes shown on [page 89](#) and [90](#). However, unlike element indexes, which cannot be changed, addresses can be changed with MODE SELECT.

SCSI reservations

The SCSI Reservations screen indicates if the library or its elements are reserved for exclusive use by a host computer. The library and its elements are reserved and released through SCSI commands (RESERVE and RELEASE).

You may want to view SCSI reservations if you are operating the library in a multi-host environment and you want to determine which elements are reserved by which host. Multiple hosts can reserve different elements within a single library. For example, Host 1 could reserve the first magazine, while Host 2 could reserve the second magazine.

To view SCSI reservations:

1. Select SCSI Reservations from the SCSI Menu. The first screen to appear is the Unit Reservation screen.

```

UNIT  RESERVATION :
Unit   Reserved :   0
Host   ID :           0

```

↓

- 2. To display the Element Reservations screen, press Z to scroll past the last item in the Unit Reservation screen.

E L E M R E S E R V A T I O N S :				↑
E l e m	E l e m	H o s t	R e s	
A d d r	T y p e	I D	I D	
0	S L O T	- N O N E -		↓

- 3. To view other elements, press W and Z. To return to the SCSI Menu, press Escape.

The information in the SCSI Reservations screen is described in the following table.

Unit reservations	
Unit Reservation	The library’s reservation status (1 if it is reserved or 0 if it is not) and the host’s ID, if the library is reserved.
Elem reservations	
Elem Addr	The address of the element.
Elem Type	The category of elements. There are three categories: robot, drive, and slot.
Host ID	The SCSI ID of the host that currently has the element reserved.
Res ID	The ID that the element is reserved under. This is a number assigned to the element by a host when the reservation was made. If there is no reservation, the Res ID and Host ID columns display “-NONE-.”

SCSI sense data

When an error or change of state occurs, the application software can issue a SCSI REQUEST SENSE command to the library to obtain information. Some of this information, called *sense data*, is displayed on the SCSI Sense Data screen. Sense data provides information to help you diagnose problems with the library. For more detailed information about SCSI sense data, refer to the *EXB-210 and EXB-220 8mm Libraries SCSI Reference*.

To view the sense data:

1. Select SCSI Sense Data from the SCSI Menu. The following screen appears.

S e n s e	D a t a ,	I D	0
K E Y	0 h	B y t e 1 5	0 0 h
A S C	0 0 h	B y t e 1 6	0 0 h
A S C Q	0 0 h	B y t e 1 7	0 0 h

The ID at the top of the display is the SCSI ID of the host that the sense data is being held for. (Note that sense data is supplied for inactive IDs as well as active IDs.)

2. To view other devices, press W and Z. To return to the SCSI Menu, press **Escape**.

The following table describes the information in the Sense Data screen.

Sense data	
KEY	This is the sense key returned by the REQUEST SENSE command. The sense keys are: 0h–No Sense There is no specific sense key information to report. 2h–Not Ready The library is not ready to perform motion commands. 4h–Hardware Error The library detected a hardware failure during a self-test or while performing a command. Operator intervention may be required. 5h–Illegal Request There was an illegal parameter in the command descriptor block or in the additional parameters supplied as data for a command, or the library is in the wrong mode to execute the command. 6h–Unit Attention The cartridge inventory may have been violated. Bh–Aborted Command The library aborted the command. The initiator may be able to recover by trying the command again.
ASC	This is the Additional Sense Code, which, along with the Additional Sense Code Qualifier, provides information describing a specific error condition.
ASCQ	This is the Additional Sense Code Qualifier, which, along with the Additional Sense Code, provides information describing a specific error condition.
Byte 15	This is the Sense Key Specific data, which provides additional information about an error condition. This information is valid only for the Illegal Request (5h) sense key.
Byte 16	This is the first byte of the Field Pointer data. It indicates which byte in the command had an error. This information is valid only for the Illegal Request (5h) sense key.
Byte 17	This is the second byte of the Field Pointer data. This information is valid only for the Illegal Request (5h) sense key.

Viewing statistics

The Statistics Menu contains two selections: one for reviewing information about robot movements and one for reviewing information about elements.

To view statistics:

1. Select Library Info Menu from the Main Menu, then select Statistics. The first screen to appear is the System Stat Totals screen.

S Y S T E M S T A T T O T A L S :			
M o v e s		7 1 0 7	
P i c k R e t r y		0	
P u t R e t r y		0	↓

2. To display the Element Stats screen, press Z to scroll past the last item in the System Stat screen.

E L E M S T A T S , I N X = 0 : ↑			
T o t a l P u t s :		0	
R e t r i e s : P i c k		0	
P u t 0 S c a n		0	↓

The following table describes the information in the Statistics screen.

System statistics	
Moves	The number of times the robot has picked a cartridge and placed it in a slot or tape drive.
Pick Retry	The number of times the robot retried picking a cartridge.
Put Retry	The number of times the robot retried placing a cartridge.
D1 Dbl Piks D2 Dbl Piks	The number of times the library had to grab a cartridge twice to remove it from the tape drive in Drive slot 1 or 2. A Dbl Pik results when the cartridge is not ejected far enough for the robot to grasp.
Scans*	The number of times the library scanned a bar code label.
Scan Retry*	The number of times the library retried scanning a bar code label.
Scan Fail*	The number of times the library failed to scan a bar code. The library tried to scan a bar code several times before it logs a failure.
Element statistics	
Total Puts	The number of times a cartridge was placed in that element since the library was turned on.
Retries: Pick	The number of times the library retried picking from that element.
Retries: Put	The number of times the library retried placing a cartridge in that element.
Retries: Scan	The number of times the library retried scanning that element.

* If your library does not include a bar code scanner, these fields always display zero.

Viewing system sensors

The System Sensors screens enable you to troubleshoot hardware problems by checking the current status of the library's internal mechanical sensors.

To view system sensors:

1. Select Library Info Menu from the Main Menu, then select System Sensors. The first screen to appear is the Digital Sensors screen.

D I G I T A L S E N S O R S :		
D o o r C l o s e d		1
K e y L o c k		1
G r i p p e r H o m e		0 ↓

2. To display the Analog Sensor screen, press Z to scroll past the last item on the Digital Sensors screen.

A N A L O G S E N S O R S :			↑
T e m p e r a t u r e :	2 3	C	
+ 1 2 V :	1 1 8 1 6	m V	
- 1 2 V :	- 1 2 2 3 3	m V	↓

The following table describes the information in the System Sensors screens.

Digital system sensors	
Door Closed	Indicates whether the front door is closed (1) or open (0).
Key lock	Indicates whether the front door is locked (1) or unlocked (0).
Gripper Home	Indicates whether the gripper is located in its home position (1) or not (0). The gripper is in its home position when the gripper fingers are open.
Cart Seated	Indicates whether the cartridge is seated in the robot (1) or not (0).
Analog system sensors	
Tem-perature	Indicates the temperature of the library in degrees Celsius.
+ 12V	Indicates the output of the + 12-volt power supply in millivolts.
-12V	Indicates the output of the -12-volt power supply in millivolts.
+ 24V	Indicates the output of the + 24-volt power supply in millivolts.

Viewing the command history

The Command History screen creates a display of the most recent 300 events that have occurred in the library. If you contact technical support personnel, a technician may ask you to scroll through this buffer and find particular events.

To display the command history:

1. From the Main Menu, select Library Info Menu.
2. From the Library Info Menu, select Command History. The system displays a screen similar to the following.

```

0 0 0   M O V E           1 9 : 3 7 : 4 5
      M o v e   f r o m   8   t o   8 2
c o m p l e t e
1 8 6 1   0 4 - 2 7 - 9 9   0 4 4 4 1
  
```

3. Scroll through the buffer by pressing Z and W.
4. To exit the command history screen, press Escape.

The following table briefly describes the Command History screen. For complete details, refer to the History Buffer Display in the maintenance manual for your library.

Shown in sample	Field name	Description
000	IDX (Index)	The line number of this event within the Command History. The range is 000 (the most recent event) through 299. The most recent event is displayed first.
MOVE	From	The process that logged this event.
19:37:45	Time	The time that the event took place, according to the library's internal clock.
Move from 8 to 82 complete	Description	Description of the event.

Shown in sample	Field name	Description
1861	Line	The line number of the source code that logged this event.
12-27-95	Date	The date that the event took place, according to the library's internal calendar.
04441	Seq	The sequence number of this event across all system buffers.

Viewing inventory information

The library stores inventory information in nonvolatile, random access memory (RAM) and uses the information to process SCSI commands from the application software. The inventory contains information about the following element locations:

- Robot
- Cartridge slots
- Tape drives

The Inventory Menu allows you to display the following information:

- Bar Code Label information. This includes data about whether the bar code scanner could accurately scan the label.
- Element occupied information. This includes data about whether the element contains a cartridge and whether a magazine or tape drive is installed.
- Element position information. This includes data about the exact position of each element.

Bar code label information

If your library is equipped with a bar code scanner, you can view information about the bar code labels attached to your cartridges.

To display bar code label information:

1. From the Main Menu, select Library Info Menu.
2. From the Library Info Menu, select Inventory Menu. The following menu appears.

```

→ L a b e l   I n f o r m a t i o n
   O c c u p i e d   I n f o
   P o s i t i o n   I n f o
                                     ↓
  
```

3. From the Inventory Menu, select Label Information. The following screen appears.

```

E L E M   L A B E L ,   I N X =   0 :
   L a b e l :
   V a l i d / E r r o r :   0 / 0
   S e n d   V o l   M a t c h :   0   ↓
  
```

4. Press Z to view a higher element index; press W to view a lower element index.

The following table describes the fields on the Element Label screen.

Element label	
INX	Displays the element index for which information is being displayed.
Label	If the element location contains a cartridge whose bar code label has been scanned, the Label field contains the cartridge label. (If the library is not equipped with a bar code scanner, this field is blank.)
Valid	Indicates whether the Label field is accurate, as follows: 0 – The Label field is not accurate. 1 – The Label field is accurate. (If the library is not equipped with a bar code scanner, this field is 0.)
Error	Indicates whether the bar code scanner was unable to read the cartridge label, as follows: 0 – The bar code scan was successful, a reset condition occurred, or the door was opened. 60 – The bar code scanner could not read the bar code label because there was no label on the cartridge. 61 – The bar code scanner could not read the bar code label because the label was unreadable. 62 – The bar code scanner could not read the label because the magazine or tape drive is not installed. 65 – The bar code scanner could not read the label because a Direct Memory Access overrun occurred. 67 – The bar code scanner could not read the bar code label because a Direct Memory Access channel time-out occurred. 69 – The bar code scanner could not read the label because the label was upside down or misplaced. (If the library is not equipped with a bar code scanner, this field is 0.)

Element label	
Send Vol Match	Indicates whether the cartridge label matched the template sent with the last SEND VOLUME TAG SCSI command, as follows: 0 – The label did not match the template. 1 – The label matched the template.

Element occupied information

To view element occupied information:

1. From the Main Menu, select Library Info Menu.
2. From the Library Info Menu, select Inventory Menu. The following menu appears.

```

→ L a b e l   I n f o r m a t i o n
   O c c u p i e d   I n f o
   P o s i t i o n   I n f o
                                     ↓

```

3. From the Inventory Menu, select Occupied Info. The following screen appears.

```

E L E M   O C C U P ,   I N X =   0 :
   A d d r / S r c :           0 / 1
   O / V / P / A :    0 / 1 / 1 / 1
   D / W / C :           0 / 0 / 1
                                     ↓

```

4. Press Z to view an element with a higher index; press W to view an element with a lower index.

The following table describes the fields in the Occupied Info screen.

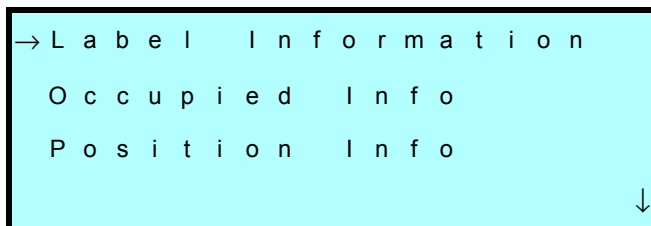
Occupied Info screen	
INX	Displays the element index for which information is being displayed.
Addr (Address)	Shows the SCSI address of this element.
Src (Source Element Index)	Shows the index of the last storage element from which the cartridge was moved.
O (Occupied)	Indicates whether the library considers the specified element location to contain a data cartridge. 0 – The element location does not contain a data cartridge. 1 – The element location contains a data cartridge.
V (Occupied Valid)	Indicates whether the Occupied flag is accurate. 0 – The Occupied flag is questionable (may not be accurate). 1 – The Occupied flag is accurate.
P (Cartridge Magazine or Tape Drive Present)	Indicates whether the magazine or tape drive is installed. If the element index references a storage element, this flag indicates whether the magazine is installed. If the element index references a tape drive, this flag indicates whether that particular drive is installed. 0 – Not installed 1 – Installed Note: The P (Present) flag is not used for the robot.

Occupied Info screen	
A (Tape Drive Accessible)	Indicates whether a drive is empty, a cartridge is loaded in the drive, or the cartridge is ejected. 0 – A cartridge may be loaded in the drive. 1 – The drive is empty, or the cartridge is ejected and ready to be picked.
D (Drive)	Indicates whether this element is a tape drive. 0 – The element is not a tape drive. 1 – The element is a tape drive.
W (Warning)	Currently not used.
C (Calibrated)	Indicates whether the element position has been calibrated. 0 – Not calibrated. 1 – Calibrated.

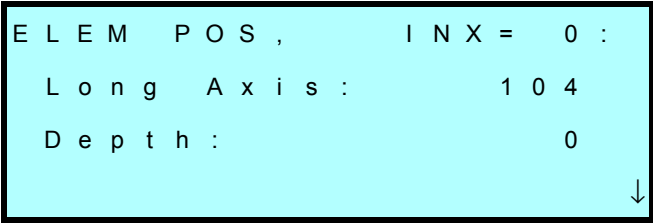
Element position information

To view element position information:

1. From the Main Menu, select Library Info Menu.
2. From the Library Info Menu, select Inventory Menu. The following screen appears.



3. From the Inventory Menu, select Position Info. The following screen appears.



4. Press Z to view an element with a higher index; press W to view an element with a lower index.

The following table describes the fields in the Position Info screen.

Position Info screen	
INX	Displays the element index for which information is being displayed.
Long Axis	Indicates the distance (in thousandths of an inch) the robot has to move along the long axis from its home position to the specified element location.
Depth	Indicates the distance the robot has to move along the short axis from its home position to touch the magazine or a cartridge in the magazine. (This field is not used for the tape drives or robot.)

Configuring the serial ports for diagnostics

You can use one of the library's serial ports and a terminal emulation program (such as CHSTERM) to access the library firmware. The console interface, also referred to as the Diagnostic Console, allows you to view information about the library, perform diagnostics tests, create diagnostic listings, and download new firmware (available from Exabyte's web site at www.exabyte.com). You can also use the library's serial ports to perform diagnostics on the tape drives.

The following table illustrates the functions you can perform using the serial ports. As the table indicates, unless you want to control the motion of the robot, you do not need to switch to 25/9-Pin Serial Port control mode.

Function	Serial Port		Must change control modes?
	9-Pin	25-Pin	
Controlling the robot for diagnostic purposes	✓	✓	✓
Upgrading library firmware	✓		
Creating diagnostic listings for the library	✓	✓	
Upgrading tape drive firmware	✓	✓	
Controlling the tape drives for diagnostic purposes	✓	✓	

For detailed information about using the Diagnostic Console and the serial ports, refer to the maintenance manual for your library.

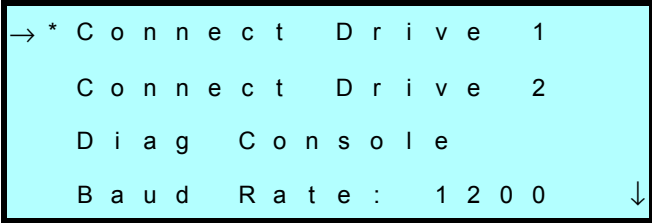
To configure the port:

1. If necessary, disable security (see [page 47](#)).
2. If you want to control robot motion, change the control mode to 25/9-Pin Serial Port mode (see [page 56](#)).

➤ **Important** Do not change to a serial port control mode if you want to connect a serial port to a tape drive.

3. From the Interface Menu, select Config 25/9 Pin Menu.

Note: An asterisk (*) indicates the current connection.



```
→ * C o n n e c t   D r i v e   1
    C o n n e c t   D r i v e   2
    D i a g   C o n s o l e
    B a u d   R a t e :   1 2 0 0   ↓
```

➤ **Important** If you connect a serial port to a tape drive, you will interrupt any SCSI commands being sent to that drive.

4. Select one of the options listed below:
 - Connect to Drive 1 (closest to the magazine)
 - Connect to Drive 2 (farthest from the magazine)
 - Diag Console (the library's diagnostic firmware)

5. When you have selected the option you want, press **Enter**. The system configures the port and displays a confirmation message. Press **Escape** to exit this message.
6. Press Z to assign one of the baud rates to the port and press **Enter**. An asterisk (*) indicates the current connection. (Use 9600 baud to connect to a tape drive.)

If you selected Connect to Drive 1 or Connect to Drive 2 to perform tape drive diagnostics, be aware of the following:

- The library changes back to the default setting, Diag Console, after the library door has been opened and closed or after the library has been reset.
- If you attempt to exit the Config Port menu while the library is still set to Connect to Drive 1 or Connect to Drive 2, the library displays a message that instructs you to change the port setting back to Diag Console.

Notes

7 Maintenance and Service

This chapter describes the following:

- Cleaning the library
- Using touch-up paint on the housing
- Replacing the fuse
- Replacing the air filter
- Replacing the tape drives
- Returning the library for service

CAUTION

Unless you have a self-maintenance contract with Exabyte, do not attempt to replace any components in the library, other than the tape drives, fuse, and air filter. If you do so, you will void your warranty.

Cleaning the library

The only library components that should be cleaned are the tape drives and the window in the door. Instructions for cleaning the tape drives are provided on [page 75](#).

To clean the library's window, use the cleaning packet provided with the library. (To order additional cleaning packets, see "Contacting Exabyte" on the inside back cover.)

CAUTION

To avoid scratching the window, do not use abrasive cleaners, abrasive cleaning implements, harsh chemicals, or solvents.

The library's internal components are lubricated at the factory and should not be cleaned or relubricated.

To protect the internal components from dust, keep the library door closed and locked.

Using touch-up paint on the housing

For standalone models, a paint kit is available for touching up nicks and scratches on the finish. For ordering information, see "Contacting Exabyte" on the inside back cover.

Replacing the fuse

The library uses a 2.5 amp, 250-volt fuse, which is located in the fuse drawer at the back of the library next to the power cord connector. An extra fuse is provided in the fuse drawer. To order additional fuses, see “Contacting Exabyte” on the inside back cover.

CAUTION

When replacing the library’s fuse, use only the same type and rating of fuse.

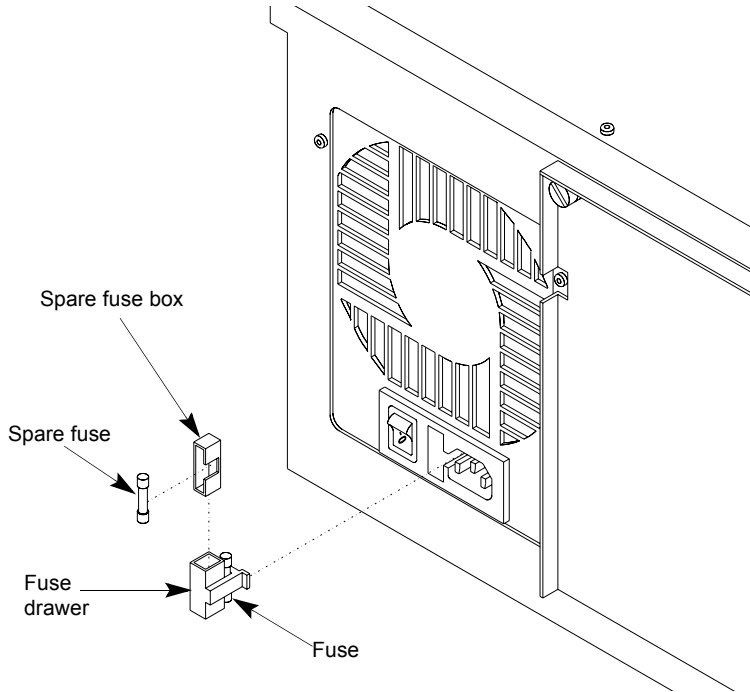
To replace the library’s fuse:

1. Power off the library and remove the power cord.

WARNING!

Before performing any of the following steps, be sure that the power switch is off and the power cord is disconnected from the library.

2. Place a small screwdriver underneath the tab on the fuse drawer. Gently lift out the fuse drawer.



3. Pull the blown fuse out of the fuse slot.
4. Use the screwdriver to push the spare fuse box out of the fuse drawer. Remove the spare fuse and place it in the fuse slot.
5. Insert the fuse drawer into the back panel. Push in until you hear it snap into place.
6. If desired, order another spare fuse for the fuse drawer.

Replacing the air filter

The library includes an air filter, located behind the door. The air filter should be replaced once a year (or more frequently if the library is operating in a dirty environment). To order replacement filters, see “Contacting Exabyte” on the inside back cover.

➤ **Important** Air filters protect the library from large contaminants, but are not intended to keep the tape drives clean. You must still clean the tape drives on a regular basis as described on [page 75](#).

To replace the air filter:

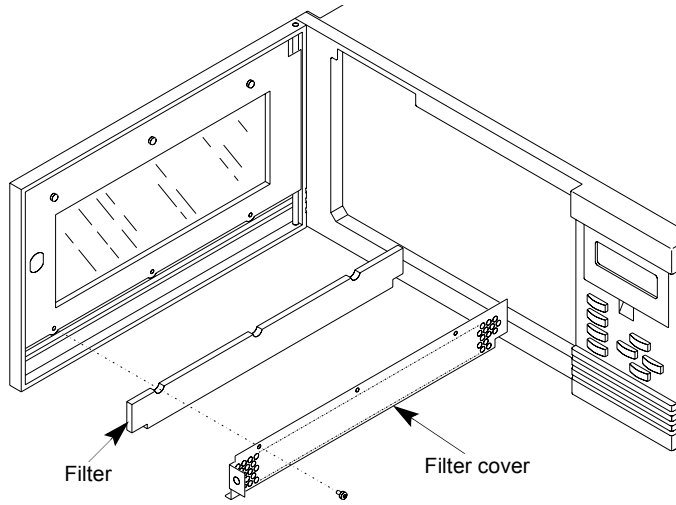
1. Unlock and open the library's door (see [page 66](#)).
2. From inside the door, use a T-15 TORX bit to remove the three screws that secure the metal filter cover to the front door, as shown in the figures on the next page.
3. Remove the metal filter cover and pull out the filter.

Note: The rack-mount model contains one long filter; the standalone model contains two smaller filters.

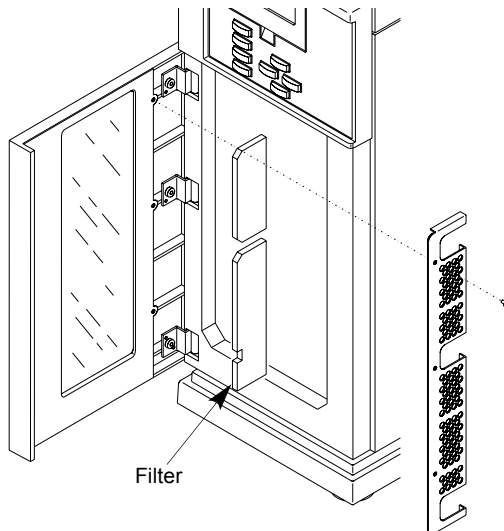
4. Replace the new filter inside the door.

5. Position the metal cover over the filter. Using a T-15 TORX bit, replace the three screws that secure the metal cover inside the front panel.

Rack-mount model



Standalone model



Replacing a tape drive (or drive blank)

Follow the steps in this section to install an Exabyte Mammoth or Exabyte M2 tape drive into your library.

➤ **Important** Do not mix Mammoth and M2 tape drives within the same library. Also, do not mix different types of SCSI configurations.

Note: When you order a new tape drive for the library, the tape drive will be shipped to you in the drive carrier. You cannot install a tape drive into the library without a drive carrier.

Prepare for replacement

1. Obtain a flat blade screwdriver. (Some models may require a #1 Phillips screwdriver.)
2. Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use an antistatic mat and grounded static protection wristband during installation. If a mat and wristband are not available, touch a known grounded surface, such as the computer's metal chassis.
3. Unlock and open the library's door (see [page 66](#)).
4. Power off the library.

5. Disconnect the power cord.

WARNING!

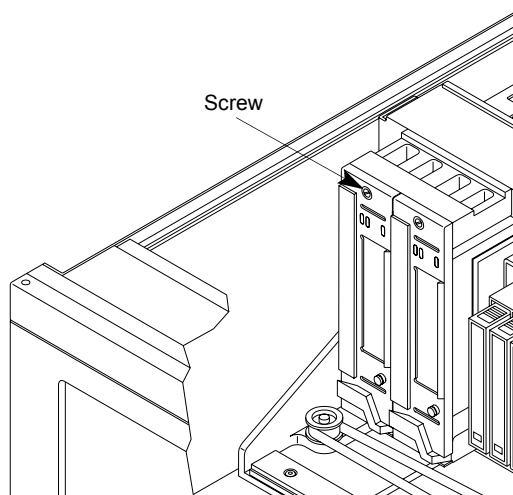
Before performing any of the following steps, be sure that the power switch is off and the power cord is disconnected from the library.

6. If necessary, reach in and push firmly against the base of the robot to move it so it is not blocking access to the tape drives.

Remove the tape drive

To remove the tape drive:

1. Using a flat blade screwdriver, loosen the two captive screws on each side of the faceplate. (Some models may require a #1 Phillips screwdriver.)



2. Pull out the lever on the faceplate. The figures on [page 128](#) show the location of the lever.

CAUTION

Do not pull out the lever without first loosening the screws.

3. Pull the tape drive out of its slot.

Install the tape drive

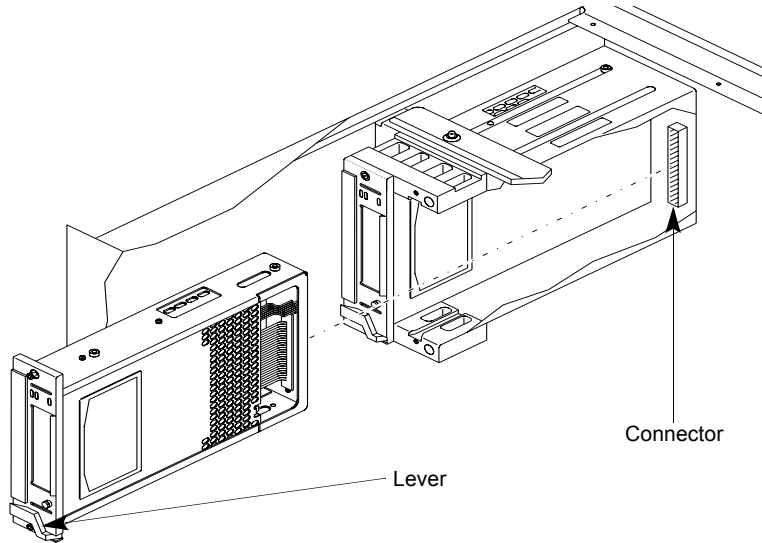
➤ **Important** While installing a tape drive, make sure you do not stick your fingers in the drive door.

To install the tape drive:

1. Insert the tape drive as shown on the next page. Make sure the lever is closed. The drive should slide easily toward the back.

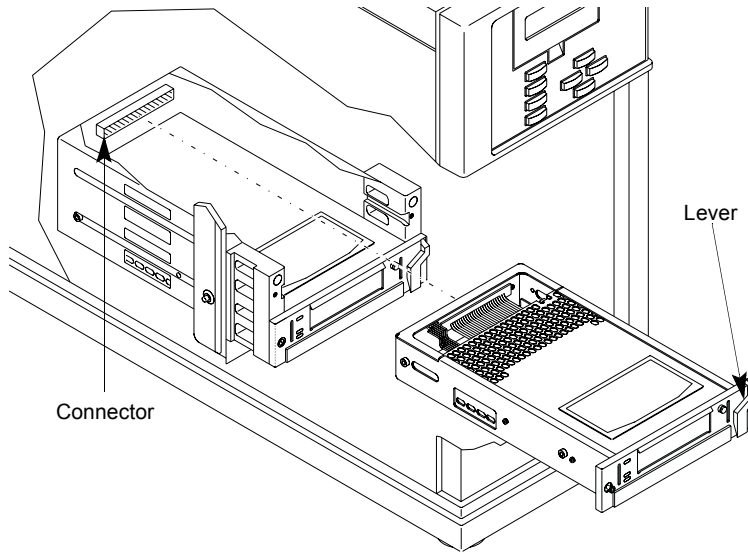
Rack-mount model

Insert the tape drive with the lever toward the bottom.



Standalone model

Insert the tape drive with the lever toward the right.



2. When the tape drive is almost completely inside the slot, you will feel some resistance. This is caused by the connection between the tape drive and the library's controller card. **To seat the connection, push firmly against the drive until you can push no further.**
3. Tighten the captive screws on each end of the drive carrier faceplate.

Resume operations

1. Reconnect the power cord.

CAUTION

To avoid damaging the tape drive, make sure the library is powered off when you connect it to the SCSI bus.

2. Close and lock the library's door.
3. Power on the library. The library will take approximately one minute to complete its power-on self-test.

Note: When you replace a tape drive, the new drive automatically assumes the SCSI ID of the old tape drive. If you want to view or change the SCSI ID of the new tape drive, see [page 41](#).

Returning the library for service

If you need to return the library to the factory for service, contact your service provider. If your service provider instructs you to return the library directly to Exabyte, contact Exabyte Technical Support to obtain a Return Materials Authorization (RMA) number and the shipping address (see “Contacting Exabyte” on the inside back cover). When you have the RMA number, follow the instructions on the following pages.

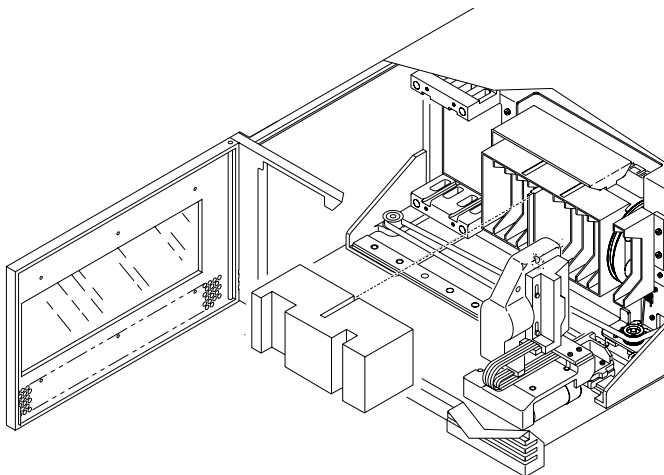
Preparing the library for shipping

To prepare the library for shipping:

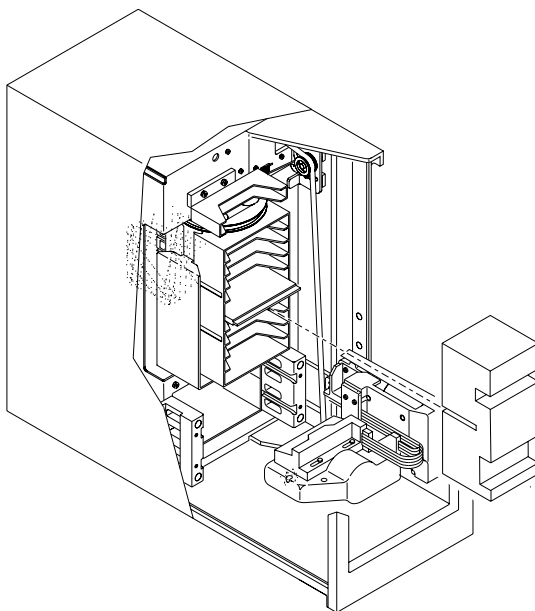
1. Remove all cartridges from the magazines. Make certain the robot gripper and the tape drives do not contain cartridges. Do not remove the magazines.
2. Power off the library.
3. Remove the keys, power cord, the SCSI cables and any terminators or jumpers. Do not ship these items if you are returning the library to the factory.

4. Insert the magazine foam packing piece in the cartridge magazine, as shown in the figures.

Rack-mount model

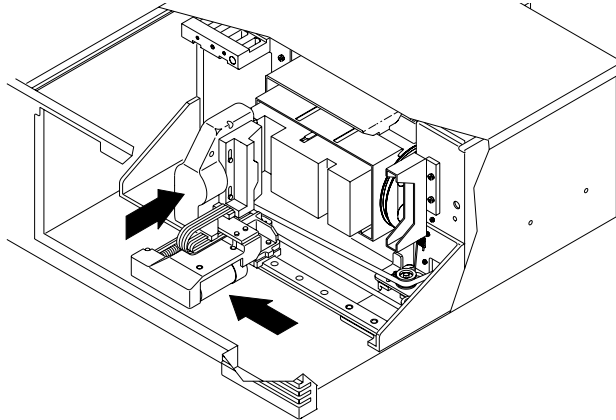


Standalone model

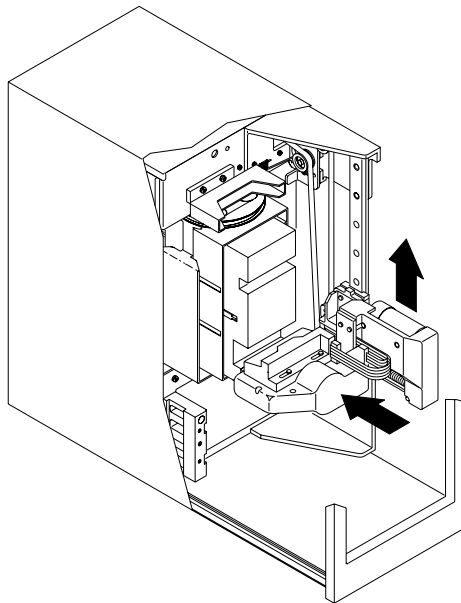


5. Move the robot so that it is centered in front of the large slot in the foam packing piece. Push the upper portion of the robot forward until it is secure between the sides of the foam.

Rack-mount model

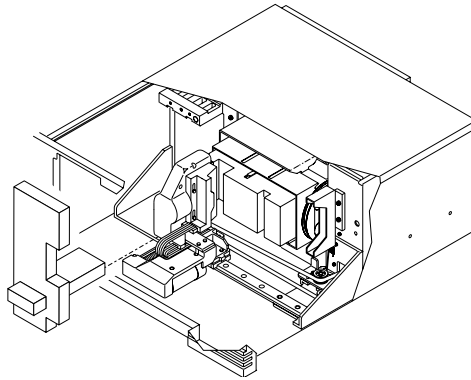


Standalone model

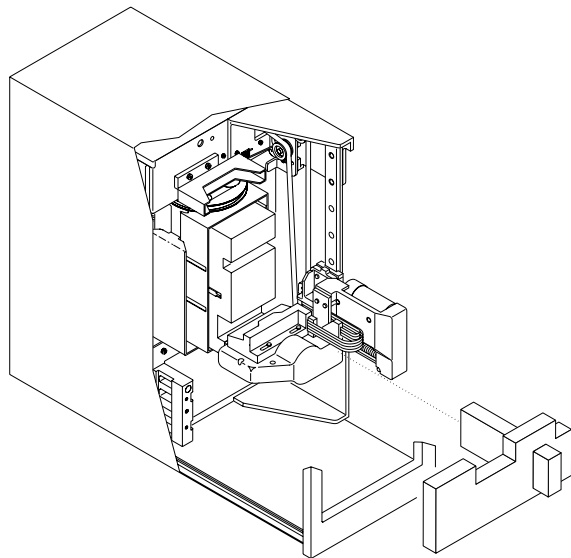


6. Insert the remaining foam packing piece between the robot and the door opening, as shown below. Make certain the foam is flush against the upper base of the robot.

Rack-mount model



Standalone model



7. Close and lock the library door. Remove the key.

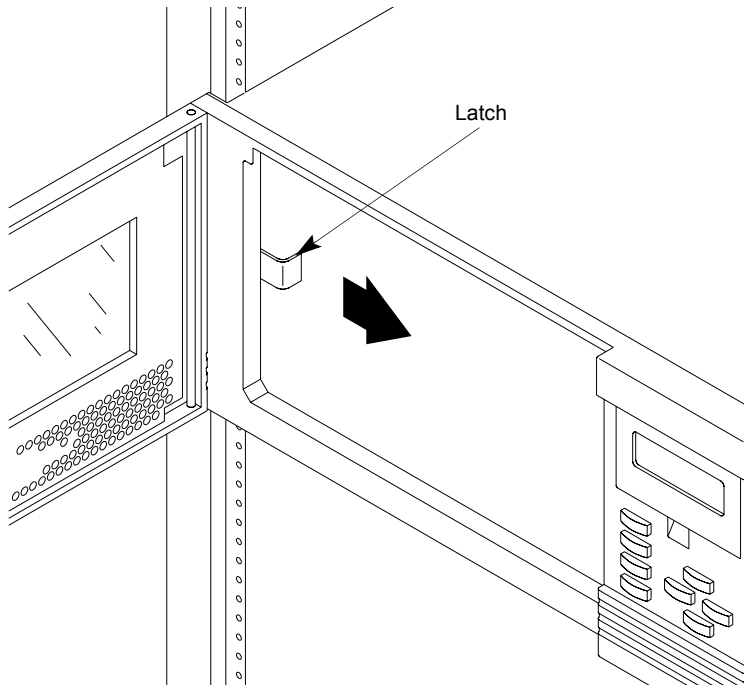
Removing the rack-mount model from the rack

WARNING!

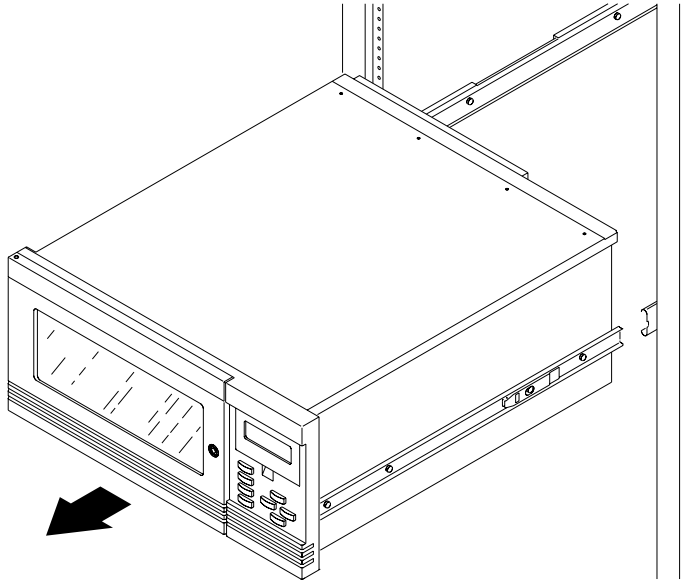
The rack-mount library weighs 50 – 70 pounds (27.2 – 31.8 kg). At least 2 people are needed to move or lift the library. Most of the weight is toward the back of the library.

To remove the rack-mount library from the rack:

1. Locate the cabinet latch, as shown in the figure below. Pull on the latch.



2. Slide the library forward until the rails stop at their spring clips. Using two people, press the spring clips to disengage the rails and lift the library out of the rack.



3. If you are shipping the slide rails with the library, use a T-20 TORX driver to remove the four screws that attach each rack slide rail to the front and rear of the cabinet. (See the figure on [page 14](#).)

Note: If clips nuts are attached to the rack, remove them.

4. Attach the two rack slide rails to the sides of the library.

Packing the library

Use the original packing materials to pack the library (shipping containers, foam packing pieces, and antistatic bag). You will also need packing tape and banding material.

CAUTION

To avoid damaging the library and voiding your warranty, be sure to use the original shipping materials (or replacement materials obtained from your vendor) when repacking and shipping the library. Do not use the shipping carton and packing materials to ship items other than a library.

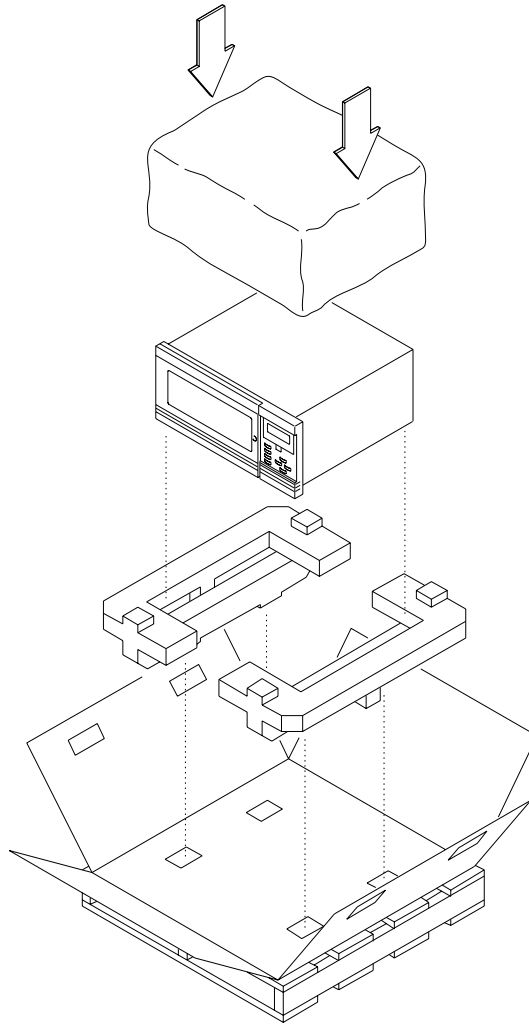
WARNING!

The rack-mount library weighs 50 – 70 pounds (27.2 – 31.8 kg); the standalone library weighs 70 – 90 pounds (31.8 – 40.9 kg). At least 2 people are needed to move or lift the library. Most of the weight is toward the back of the library.

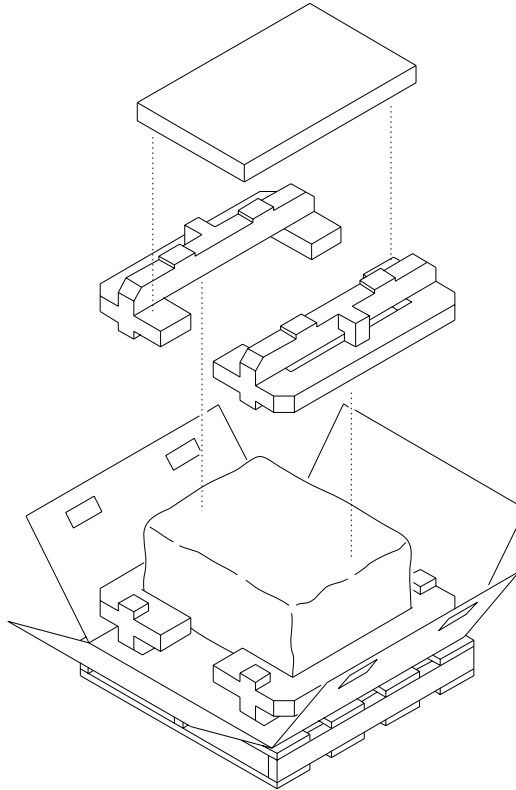
To pack the library:

1. Place the two bottom cushions on the pallet, as shown in the following figure.

2. Place the library on top of the bottom cushions, then place the antistatic bag over the library, as shown in the figure. For the standalone model, place the library on its side (robot base down).

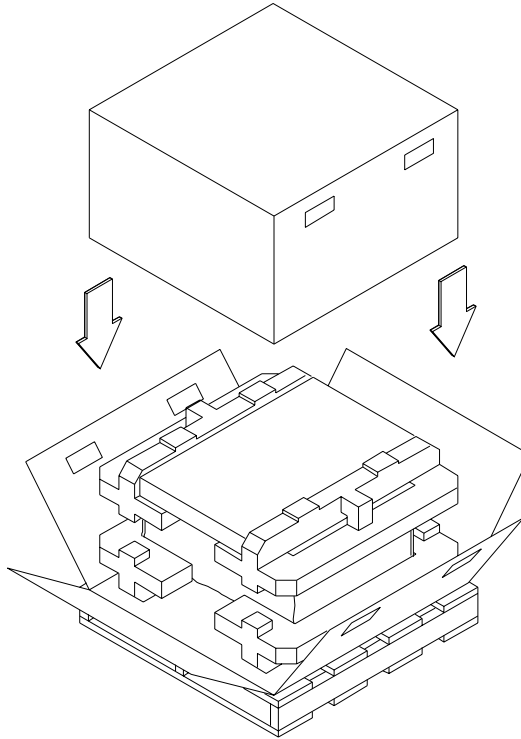


3. Place the two top cushions on the library, as shown below.
(Use the alignment holes in the packing pieces as a guide.)
4. If you are shipping accessories with the library, place the accessory box on top of the cushions, as shown below.

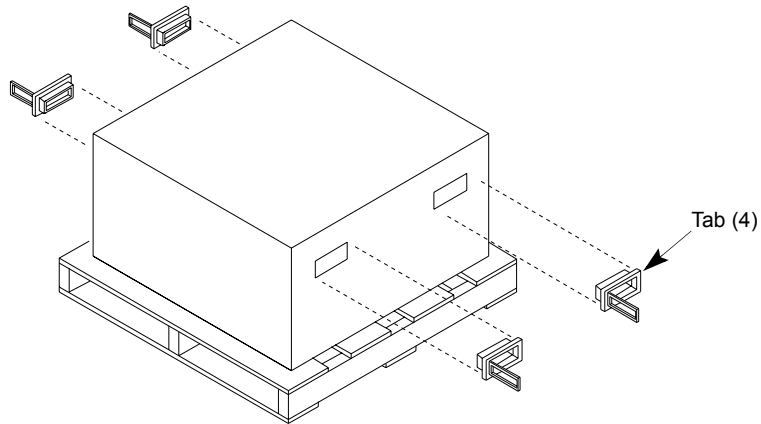


5. Lay the necessary paperwork in the top of the accessory box.

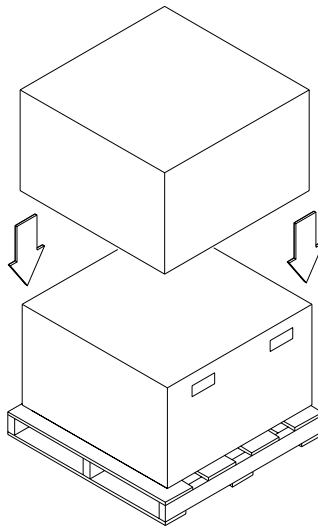
6. Fold the side flaps up and place the carton over the library, as shown in the following figure.



7. Insert the four plastic clips into the openings in the sides of the carton and press the tabs into the handle, as shown below.

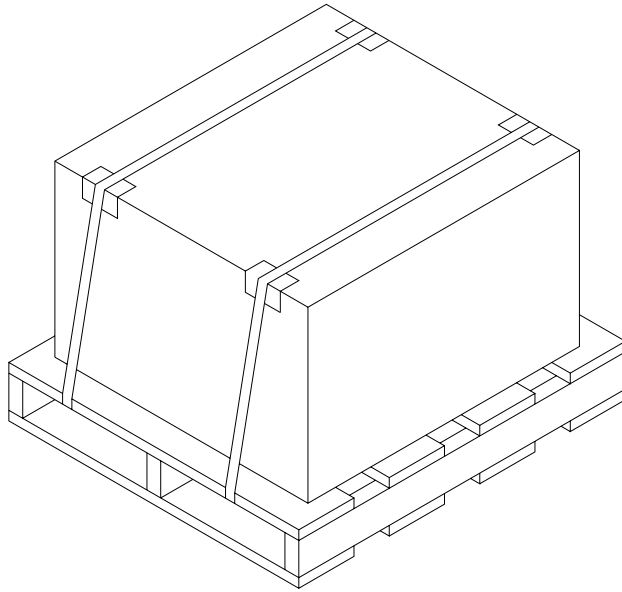


8. Place the outer sleeve over the entire box, as shown below.



9. Place the shipping label on the box.

- 10.** Place the library on the wooden pallet. Secure banding material around the box and through the wooden pallet.



Notes

A Specifications

This appendix provides the following specifications:

- Storage capacities
- Overall library specifications
- Power cord requirements
- SCSI cable specifications
- SCSI terminator requirements
- Remote reset cable specifications

Storage capacities

The table below shows the maximum storage capacity of the library when two Mammoth tape drives or two M2 tape drives are installed.

	Maximum capacity ^a
Mammoth with 20 AME cartridges (170m)	800 gigabytes (GB)
M2 with 20 AME SmartClean cartridges (225m)	3 terabytes (TB)

^a Assumes that the Mammoth tape drives are writing data at a 2:1 compression ratio and the M2 tape drives are writing data at a 2.5:1 compression ratio.

The following table provides the approximate capacities in gigabytes (GB) for each AME with SmartClean cartridge.

	Maximum capacity of each AME cartridge with SmartClean ^a	
Tape length	Native	Compressed ^b
225 meters	60 GB	150 GB
150 meters	40 GB	100 GB
75 meters	20 GB	50 GB

^a For optimal tape drive performance and reliability, Exabyte recommends only SmartClean media for M2 tape drives and libraries. M2 can use other AME media, but will require regular cleaning with an Exabyte Mammoth cleaning cartridge.

^b Assumes a 2.5:1 compression ratio. Actual compressed capacity varies depending on the type of data being recorded.

The following table provides the approximate capacities in gigabytes (GB) for each standard AME cartridge.

	Maximum capacity of each standard AME cartridge	
Tape length	Native	Compressed ^a
170 meters	20 GB	40 GB
125 meters	14 GB	28 GB
45 meters	5 GB	10 GB
22 meters	2.5 GB	5 GB

^a Assumes a 2:1 compression ratio. Actual compressed capacity varies depending on the type of data being recorded.

Overall specifications for the library

General specifications	
Interface	SCSI-2, Ultra, or Ultra-2
Maximum sustained data transfer rate ^a	6.0 MB per second (Mammoth) 24.0 MB per second (M2)
Size and weight	
Size (rack-mount model)	8.6 high × 19.0 wide × 21.1 long (inches) (21.98 × 48.26 × 53.67 cm)
Size (standalone model)	22.0 high × 9.4 wide × 21.4 long (inches) (55.88 × 24.0 × 54.36 cm)
Weight (rack-mount model)	63.4 lbs (28.76 kg) with two tape drives installed
Weight (standalone model)	82.0 lbs (37.2 kg) with two tape drives installed
Operating environment	
Ambient temperature	+5°C to +35°C (+41°F to +95°F)
Relative humidity	20% to 80%, noncondensing
Wet bulb	26°C (79°F) max
Power	
Input voltages	Accepts 100 to 240 VAC at 50 to 60 Hz; automatic input voltage selection
Power consumption	60 watts minimum; 110 watts maximum
BTU consumption	205 BTU/hour minimum; 375 BTU/hour maximum

^a Assumes a 2:1 compression ratio for Mammoth and a 2.5:1 compression ratio for M2.

Power cord requirements

The library is shipped with a seven-foot (2.1 meter), 18 AWG, 3-conductor AC power cord for 120 volt use in the United States and Canada. The power cord has a molded NEMA 5-15P male connector on one end and a molded IEC type CEE-22 female connector on the other end. The power cord is UL Listed and CSA Certified. If you are planning to use an input voltage other than 120 volts AC or if you plan to use the library outside of the United States or Canada, you must supply your own power cord, as described below.

Criteria for U.S. and Canadian 220 VAC power cord:

- The power cord must have a molded NEMA 6-15P attachment plug on one end.
- The power cord must have a molded IEC type CEE-22 female connector on the other end.
- The cordage must be an SJT or SVT type, 3-conductor, 18 AWG minimum.
- The power cord must comply with local electrical code.

Criteria for an international 220 VAC power cord:

- The power cord must have an attachment plug of the proper type, rating, and safety approval for the intended country.
- The power cord must have an IEC 320 female connector on one end.
- The flexible cord must be harmonized to CENELEC publication HD-21. The electrical characteristics and rating must be minimum H05VVF3G0.75 (6 A).

SCSI cable specifications

The following tables list the recommendations for external SCSI cables for the library.

Wide SCSI cables	
Use cables that conform to SCSI-3 specifications. See the <i>Exabyte 220 Product Specification</i> for more information.	
Narrow SCSI cables	
Standard Construction	50 conductors (25 twisted pairs with drain wire and shield)
Primary Conductors	Gauge: #28 AWG minimum stranded (7/34) annealed, tinned copper
	Insulation: Polypropylene (80° C) 0.010 inch nominal
Shielding	80% minimum tinned copper braid over aluminum/mylar foil
Voltage Rating	30 VAC
Impedance	Single-ended: 88 Ohms $\pm$ 8 Ohms Differential: 130 Ohms $\pm$ 12 Ohms
Grounding	Case-to-case grounding
Connector	50-contact AMP Amplimite 0.050 male, shielded, SCSI-2 connector

For cable length requirements, see [Appendix B](#).

SCSI terminator specifications

The SCSI terminator must match the SCSI bus configuration (LVD, single-ended, or HVD, and wide or narrow). In addition, all termination must be external. Do not use internal terminators to terminate the library or the tape drives.

To ensure proper performance of the library and tape drives, Exabyte recommends one of the following external terminators.

External terminator specifications		
Narrow	Single-ended	AMP Amplimite 750381-1
	HVD	AMP Amplimite 749541-1
Wide	LVD	AMP Amplimite 796051-1
	HVD	AMP Amplimite 869515-1

Note: For best results on a single-ended bus, use active termination. Exabyte testing has shown that older passive termination does not provide rising edge transitions that are fast or clean enough at fast SCSI speeds.

Remote reset cable specifications

The remote hardware reset port on the back panel allows you to perform a manual hardware reset on the library to clear hardware errors. This port requires an 8-pin circular DIN connector and a two-wire cable capable of providing momentary contact between pin 1 and pin 2.

B SCSI Configuration

This appendix provides an overview of the SCSI interface and provides some general guidelines for connecting the library to the SCSI bus.

The SCSI interface

The Small Computer Systems Interface (SCSI) is an ANSI (American National Standards Institute) standard that defines both the physical interface used to connect devices and the signaling protocol that allows them to communicate with each other. SCSI allows an application running on a host computer to communicate with peripheral SCSI devices, such as the library and the enclosed tape drives.

The SCSI system consists of the following components:

- **Initiator.** The host computer system acts as the initiator of commands. It consists of the application software, the operating system, the device driver, and the SCSI adapter card.
- **Bus.** The SCSI cables connected to the adapter card and to the library (as well as other devices on the bus) provide a pathway (or “bus”) for passing commands.

- **Targets.** The library and the tape drives are peripheral devices (or targets) that are capable of receiving commands from the host. Up to sixteen devices (including the host computer) can be connected to the wide SCSI bus and up to eight devices can be connected to the narrow SCSI bus.

The physical interface

The physical interface determines the number of devices that can be attached to a single cable or SCSI bus, the maximum length of the cables making up the bus, and termination requirements. It also determines the physical characteristics of the cable itself (for example, the number of wires, shielding, and so forth). The SCSI standard defines three physical interfaces, single-ended, high-voltage differential (HVD, which is previously known as differential), and low-voltage differential (LVD).

Single-ended, HVD, or LVD

A single-ended SCSI bus uses one signal line to transmit information between devices. Single-ended SCSI configurations have always been popular because of their low cost, but they are vulnerable to signal noise and, as a result, have bus-length limitations (6 meters).

Both HVD and LVD SCSI buses use the signal differential between two lines to transmit information between devices. Because HVD configurations use a relatively high voltage on the signal lines, HVD buses are resistant to signal noise and allow greater cable lengths (up to 25 meters), but are expensive to implement. HVD devices cannot be mixed with single-ended or LVD devices on the same bus.

LVD is an alternative to the HVD interface. LVD has the same advantages (better signal noise resistance and greater bus lengths than single-ended), and is less expensive than HVD. In addition, LVD devices are compatible with single-ended devices. You can add an LVD device to an existing single-ended SCSI bus without altering the bus configuration. Most significantly, LVD supports Ultra2 Wide SCSI burst transfer rates (80 MB/second).

Note: Be aware that if you connect single-ended and LVD devices on the same bus, all devices on the bus operate as single-ended devices.

Narrow or wide SCSI

The library is available in narrow or wide configurations. A wide SCSI bus uses 68 parallel lines to transmit signals between devices on the bus. A narrow SCSI bus uses 50 parallel lines.

Fast SCSI

The library supports fast SCSI, which does not require any special cabling or configuration. However, proper cable lengths, stub length, and termination are more important on a fast SCSI bus than on a regular SCSI bus.

SCSI bus considerations

This section provides the basic guidelines and considerations for setting up the library on the SCSI bus.

SCSI IDs

Each device on the SCSI bus must have a unique ID. The host computer uses these IDs to identify each device. The SCSI ID also determines which device has priority when more than one device is trying to communicate with the host. The lower the ID, the lower the priority of the device.

Note: The SCSI ID does not depend on physical location. For example, the last device on a multi-device SCSI bus can have a SCSI ID of 2.

The library uses up to three SCSI IDs, one for the robot and one for each tape drive. Separate IDs allow the robot and each tape drive to operate as independent devices, receiving different sets of SCSI commands from the host.

SCSI bus termination

If the library is the last device on the SCSI bus, you must terminate the bus by installing a pass-through terminator on one of the library's SCSI connectors. Or, if there is an unused connector at the end of the SCSI cable, you can terminate the bus there. The library does not supply terminator power.

➤ **Important** Exabyte recommends using active termination. Exabyte testing has shown that older passive termination does not provide rising edge transitions that are fast or clean enough at fast SCSI speeds.

Cable length

The maximum length of the SCSI cable depends on whether you are using single-ended, LVD, or HVD:

- **For single-ended SCSI configurations**, the maximum allowable bus length is 3 meters (9.8 feet), terminator to terminator. A maximum cable length of 6 meters is acceptable if the transfer rate is less than 5 MB/second for narrow SCSI configurations or less than 10 MB/second for wide SCSI configurations. A stub length of no more than 0.1 meters (4 inches) is allowed off the mainline interconnection within any connected equipment.
- **For LVD SCSI configurations**, the maximum allowable cable length is 12 meters (39 feet) if you have more than two devices on the bus. If the bus is a point-to-point configuration (two devices, the target and the initiator), the bus length can be up to 25 meters (82 feet). A stub length of no more than 0.1 meters (4 inches) is allowed off the mainline interconnection within any connected equipment.
- **For HVD SCSI configurations**, the maximum allowable cable length is 25 meters (82 feet). A stub length of no more than 0.1 meters (4 inches) is allowed off the mainline interconnection within any connected equipment.

To determine the cable length for each bus:

1. For each bus, add the lengths of all external SCSI cables.
2. To that total, add the SCSI cable lengths used by the library *for each bus*:
 - For each tape drive, add 23 centimeters (9 inches) to allow for the cable used by the tape drive inside the library.
 - For each jumper you plan to install on the library, add 5 centimeters (2 inches).
 - For the library, add 5 centimeters (2 inches) for the internal cable used by the library itself.

C Error Codes

This appendix describes the error codes that appear on the library's LCD (liquid crystal display). LCD error codes do not reflect tape drive errors.

CAUTION

Library components can be replaced only by Exabyte-approved service providers. If you cannot find an obstruction or other obvious cause for the problem, contact your service provider. Unless you have a self-maintenance contract, do not attempt to replace any components. If you do, you will void your warranty.

For information about SCSI error conditions (sense data), refer to [page 101](#) and to the *EXB-210 and EXB-220 8mm Libraries SCSI Reference*.

CAUTION

Some corrective actions advise you to reset the library. Before resetting, make sure there is no SCSI activity on any connected SCSI bus, so you do not disrupt communications.

The following table lists the library hardware error conditions in numerical order.

Error no.	Description	Corrective action
10	DROPPED A CARTRIDGE. The robot dropped a cartridge.	If the cartridge label was removed, make sure that there is no label adhesive remaining on the cartridge. If the label was not removed, contact your service provider. CAUTION: Do not try to put the cartridge back in the robot gripper.
11	SOURCE EMPTY. There is no cartridge in the source location.	Install a cartridge in the source location or redirect the robot to another location.
12	DESTINATION FULL. A cartridge already exists in the destination location.	Remove the cartridge from the destination or redirect the robot to another location.
13	PUT MECH. FAILURE. The robot could not successfully place a cartridge because of mechanical problems.	Make sure there is nothing blocking the robot or the tape drives. If the error persists, contact your service provider.
14	PICK MECH. FAILURE. The robot could not successfully pick a cartridge because of mechanical problems.	

Error no.	Description	Corrective action
15	NO SRC ELEMENT; NO DEST ELEMENT. No data cartridge magazine was installed at the selected location.	Install a data cartridge magazine or redirect the robot.
16		
17	CHM FULL BEFORE MOVE. There was a cartridge in the gripper when the operator powered-on or reset the library, or before a move operation.	Remove the cartridge and put it back in the cartridge magazine if you know where it goes. Make sure the library and tape drives are not being used by any host, then press Reset on the operator panel. If the error persists, contact your service provider.
18	SRC CART INSIDE DRIVE. The robot could not successfully pick a cartridge because it was still loaded in the tape drive.	Press the tape drive unload button and wait for the cartridge to be unloaded, or redirect the robot to another location.
19	PICK MECH. FAILURE. The robot could not successfully pick from a full cartridge slot.	Open the door and look for anything that might be obstructing the gripper. Make sure the library and tape drives are not being used by any host, then press Reset on the operator panel. If the error persists, contact your service provider.
21	GRIP HOME ERROR. A gripper error occurred.	
22	GRIP MOTION TIMEOUT. A gripper motion took longer than the maximum time allocated for it. When motion functions do not complete in the allocated time, the current to the servo motors is shut off.	
25	PICK STALL. The robot stalled while trying to pick a cartridge from the tape drive.	

Error no.	Description	Corrective action
26	CANNOT OPEN GRIPPER. The gripper could not open.	Open the door and look for anything that might be obstructing the robot gripper.
30	S AXIS DOES NOT MOVE. The robot could not move along the short axis.	Make sure the library and tape drives are not being used by any host, then press Reset on the operator panel. If the error persists, contact your service provider.
31	S AXIS FAILED HOME. The robot could not return to the home position along the short axis.	
36	S LM629 FAILURE. The library could not reset the servo chip for the short axis.	Make sure the library and tape drives are not being used by any host, then press Reset on the operator panel. If the error persists, contact your service provider.
38	CANNOT LOAD DRIVE. The robot could not load the cartridge into the tape drive. (It could not move in far enough on the short axis.)	▪ Open the door and look for anything that might be obstructing the robot along its short axis. ▪ Make sure that a cartridge is not already loaded in the tape drive. ▪ Make sure that the flap on the cartridge is closed. ▪ Make sure the library and tape drives are not being used by any host, then press Reset on the operator panel. If the error persists, contact your service provider.
40	L AXIS DOES NOT MOVE. The robot could not move along the long axis.	Open the door and look for anything that might be obstructing the robot gripper.
41	L AXIS FAILED HOME. The robot could not return to the home position on the long axis.	Make sure the library and tape drives are not being used by any host, then press Reset on the operator panel. If the error persists, contact your service provider.

Error no.	Description	Corrective action
46	L LM629 RESET FAIL. The library could not reset the servo chip for the long axis.	Make sure the library and tape drives are not being used by any host, then press Reset on the operator panel. If the problem persists, contact your service provider.
50	D AXIS DOES NOT MOVE. The drum could not move on its axis.	Open the door and look for any obstructions around the drum. If there are no obstructions, contact your service provider.
51	D AXIS FAILED HOME. The library could not determine the home position for the drum.	Contact your service provider.
60	NO LABEL. The bar code scanner could not read the bar code label because there was no label on the cartridge.	If present, this error appears on the Label Info screen. If the cartridge does not have a label, place a label on the cartridge. If the cartridge does have a label, reposition or replace it. If the error persists, contact your service provider.
61	READ ERROR. The bar code scanner could not read the bar code label because the label was unreadable.	
62	NOT PRESENT. The bar code scanner could not read the bar code labels because there was no data cartridge magazine present.	If present, this error appears on the Label Info screen. If necessary, install a data cartridge magazine.
65	DMA OVERRUN. The bar code scanner could not read the bar code label because a Direct Memory Access overrun occurred.	If present, this error appears on the Label Info screen. Make sure the library and tape drives are not being used by any host, then press Reset on the operator panel.
67	DMA CH. 2 TIMEOUT. Controller board error.	If the error persists, contact your service provider.

Error no.	Description	Corrective action
69	LABEL UPSIDE DOWN. The bar code scanner could not read the bar code label because the label is upside down.	If present, this error appears on the Label Info screen. Remove the label and reposition it on the cartridge. If the label is affixed correctly, contact your service provider.
70	L SERVO TIMEOUT. The robot could not reach its destination along the long axis.	Open the door and look for anything that might be obstructing the robot along its long axis. Make sure the library and tape drives are not being used by any host, then press Reset on the operator panel. If the error persists, contact your service provider.
71	PARAMETER > LIMIT. Firmware error.	Make sure the library and tape drives are not being used by any host, then press Reset on the operator panel. If the error persists, contact your service provider. You may be asked to supply a diagnostic listing, and you may need new firmware.
72	FRONT DOOR OPEN. The front door is open or the door solenoid is malfunctioning.	- Close and lock the door. - If the error still appears, make sure the library and tape drives are not being used by any host, then press Reset on the operator panel. - If the error persists, contact your service provider.
73	S SERVO TIMEOUT. The robot could not reach its destination along the short axis.	Open the door and look for anything that might be obstructing the robot along its short axis. Make sure the library and tape drives are not being used by any host, then press Reset on the operator panel. If the error persists, contact your service provider.

Error no.	Description	Corrective action
75	INTERNAL S/W ERROR. Firmware error.	Make sure the library and tape drives are not being used by any host, then press Reset on the operator panel. If the error persists, contact your service provider. You may be asked to supply a Diagnostic listing, and you may need new firmware.
76	POS ERROR TIMEOUT. The robot could not reach its destination along the long axis.	Open the door and look for anything that might be obstructing the robot along its long axis. Make sure the library and tape drives are not being used by any host, then press Reset on the operator panel. If the error persists, contact your service provider.
77	INTERFACE DISABLED. The library was not in the correct control mode when the operator sent a command.	Make certain you have set the correct control mode. If the library is in the correct control mode, contact your service provider.
90	INVALID BLANK CONFIG. The drive blank configuration is invalid.	If you operate the library with one drive, you must have a drive blank installed in the outermost slot.
91	OPERATOR ABORTED. A diagnostic was aborted while it was in progress.	No corrective action required.
97	DRIVE NOT INSTALLED. The tape drive could not be cleaned because no tape drive is installed in this location.	This error only appears on the Clean Drives Menu. If no tape drive is installed in the location, redirect the robot. If a tape drive is installed, make sure that the drive carrier is correctly seated. If the error persists, contact your service provider.

Error no.	Description	Corrective action
98	NO MAGAZINE. There is no magazine installed in this location.	If no magazine is installed in that location, redirect the robot. If a magazine is installed, make sure that it is correctly seated on the mounting plate. If the error persists, contact your service provider.
101	DRUM MOVE, SAXIS EXT. The robot could not move along the short axis.	Open the door and look for anything that might be obstructing the robot along its short axis. Make sure the library and tape drives are not being used by any host, then press Reset on the operator panel. If the error persists, contact your service provider.
104	DRIVE DID NOT EJECT. The robot timed out waiting for a tape drive to eject a cartridge.	There may be a problem with the tape drive. Call your service provider.
108	INVALID BOOT ROM. The installed boot ROM is not compatible with the flash EEPROM code.	You do not have the correct boot ROM for the firmware you are trying to run in your library. Contact your service provider.
109	CHECK CLEANER. The cleaning cartridge was ejected immediately after being loaded into the tape drive.	Replace the cleaning cartridge. Make sure you are using the correct cleaning cartridge as described on page 10 . If the error persists, contact your service provider. Note: This error displays only if the cleaning was requested from the operator panel.
115	EMPTY DRIVE SLOT. There is no tape drive in this drive slot.	Make sure that all tape drive slots have either a tape drive or a drive blank installed.

Error no.	Description	Corrective action
130	FAS216 Error	Make sure the library and tape drives are not being used by any host, then press Reset on the operator panel. If the error persists, contact your service provider.
131	SCSI Unexpected Int	
132	SCSI Int Stuck Error	
133	There is a SCSI chip failure.	
134		
135		
136		
137		
190	HIT CART IN DEST. The robot performed a move that caused a cartridge collision.	Open the door and look for anything that might be obstructing the robot along its short axis. Make sure the library and tape drives are not being used by any host, then press Reset on the operator panel. If the error persists, contact your service provider.
191	Mammoth & 85XX. You have installed an Eliant 820 tape drive in the same library with a MammothTape drive.	You cannot mix MammothTape drives and Eliant 820 tape drives in the same library.

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Contacting Exabyte

To obtain technical support	
Exabyte Technical Support	1-800-445-7736
	1-303-417-7792
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World Wide Web	www.exabyte.com www.mammothtape.com www.m2wins.com
To order supplies and accessories	
Exabyte	1-800-774-7172 or 1-800-392-8273
To return equipment for service	
Exabyte Service	1-800-445-7736
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Note: If it is more convenient to your location, contact Exabyte Technical Support in Europe at the following numbers:

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